ROYAL BOTANIC GARDENS, KEW.

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XXXVII.—A VISIT TO THE ARNOLD ARBORETUM.

(With Plates).

W. J. Bean.

For many years past the most generous contributor of hardy trees and shrubs to Kew has been Professor C. S. Sargent, Director of the Arnold Arboretum, near Boston, U.S.A. It has long been known to us that in the establishment he controls there exists the richest collection in the world of the hardier North-east American and North Asiatic woody plants, and, with a view to ascertaining what was lacking in, and might be obtained for, the Kew collection, I was deputed by the Director to pay a visit to this establishment, and afterwards to see as much of the horticulture—especially the tree and shrub growth—of the surrounding country as was possible in the twenty days I remained there. I landed in Boston on June 16th, and sailed for home from New York on July 6th last. About half my time was spent in the Arnold Arboretum, and I also visited the public gardens of Boston, New York and Rochester, the Victoria Park on the Canadian side of Niagara, as well as some private gardens of repute in the neighbourhood of Boston and New York.

I have to acknowledge my indebtedness to Professor Sargent not only for many courtesies received whilst I stayed in the Arnold Arboretum, but also for using his good offices to make my visits to other establishments easier and more profitable.

History and Origin.

The Arnold Arboretum extends over some 220 acres and is situated in Jamaica Plain, one of the suburbs of Boston, easily reached from any part of the city by electric tramcars. It owes its name and origin to Mr. James Arnold, a wealthy merchant of New Bedford and a member of a well-known Quaker family, who, about the year 1870, left 100,000 dollars "for the promotion of agricultural or horticultural improvement." One of the trustees of this fund was Mr. George B. Emerson, the author of the well-known work

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on the "Trees and Shrubs of Massachusetts," and largely through his efforts and influence, Harvard University was induced to devote 125 acres of some lands belonging to it, known as "Bussey Farm," to the purpose of forming an arboretum. Ultimately the fund grew to 150,000 dollars and a chair of arboriculture with Professor Sargent as its first occupant was instituted in 1873. The area has since been added to by some 90 acres.

The income from 150,000 dollars was a small sum with which to make and carry on an arboretum of the dimensions contemplated, yet with this Professor Sargent was expected to develop over 120 acres into a scientific garden and without (as he observes) a library, or collection of plants, public interest or support to begin with. Difficult as the task was, it has been accomplished, and the Arnold Arboretum is to-day a remarkable monument to the hard work, perseverance, diplomacy and skill of one man. Since its foundation Professor Sargent has raised some 1,200,000 dollars (chiefly, I believe, from private sources) to develop and maintain the institution, and his aim is to secure an endowment fund of at least 1,000,000 dollars to carry it on in permanence. Considering the work the Arboretum has done and is doing, that sum seems a very modest one and, in a country so rich as the United States in public-spirited men, will no doubt be obtained. Besides an incalculable amount of work, Professor Sargent himself has given his books, illustrations and herbarium to the Arboretum—a princely gift, for it forms the bulk of a library now consisting of 23,000 volumes, all of which deal in greater or less degree with the woody vegetation of the globe.

The aim of the establishment is to provide facilities for the study of the trees and shrubs of the whole world, but especially those of North America. A handsome building, known as the Museum, was built in 1892, mainly at the cost of the late Mr. H. H. Hunnewell of Wellesley ; and recently an extension of it has been erected at a cost of £8,000. The older part is now used to hold the library, and to provide offices for the members of the staff. The newer portion houses the herbarium and consists of four storeys fitted with air-tight steel cabinets sufficient to hold 1,000,000 sheets. These steel cases reach from the floor to the ceiling so that there can be no accumulation of dust above them, and they are a great improvement on the common wooden ones of the older herbaria, as they are fire-proof, economise space and do not warp or admit dust. They are, of course, much more costly. On the ground floor of the Museum there is a fine collection of specimens of North American timbers, which are part of the famous Jesup collection, the main portion of which is now exhibited in the Natural History Museum at New York. In an adjoining room there is an excellent collection of the fruits of Coniferae. Many of these, especially the cones of firs, spruces and pines are too large and bulky to be accommodated on the shelves of ordinary cabinets and are here arranged in drawers.

The herbarium is under the immediate charge of Mr. C. E. Faxon, Professor Sargent's co-worker and the most famous of American botanical artists. He made the illustrations for the great *Silva of North America*, for the *Manual of the Trees of North America*, and was the regular artist for *Garden and Forest* as he is now for *Trees and Shrubs*.

Beauty of Landscape.

To one who enters the Arboretum for the first time the most striking impression received is that of its great beauty of landscape. Only a very small proportion of its area is level, and at several points it swells into bold prominences such as Peter's Hill, Bussey Hill and Hemlock Hill. The last-named is, indeed, the most remarkable part of the grounds. It is a steep hill with outcropping rock and almost precipitous on one side, covered with a primeval growth of "Hemlock"—the American name for *Tsuga canadensis*. Some of the older trees are splendid examples. I measured one over 9 feet in girth of trunk. It is a peculiarly fortunate circumstance that this wood should have been preserved to a public body in whose hands its continued existence is assured, for but little of the primeval forest of the New England States remains untouched, and the fact that this tract is almost within the confines of a large city makes it doubly precious. At its northern base a brook finds its exit from the grounds after having traversed them in various phases and makes a charming feature; especially where it has passed through a flowery meadow, the gully it has worn out fringed with native vegetation, amongst which, at the time I saw it, the elder-berry (*Sambucus canadensis*) made a pretty display.

To the top of the sister prominence, Bussey Hill, a carriage drive has been made, and from this point a great expanse of beautiful country can be seen, especially the rolling outlines of the Blue Hills in the far distance.

Another beautiful feature of the Arboretum, and one which makes a special appeal to the foreigner, is the native undergrowth. In place of the lawns and grass which cover so much of the ground in English gardens and parks, there is here a very interesting ground-covering consisting of native plants, amongst which are various species of Vaccinium, Aster, Rubus, golden rod and Asclepias, *Baptisia tinctoria*, *Comptonia asplenifolia* and the poison ivy (*Rhus Toxicodendron*). Very abundant in places—for it has thoroughly naturalised itself—is the European dyer's greenweed (*Genista tinctoria*) making a gay display in early July. Springing up freely every year amongst this low growth is a crop of seedling oaks and hickories so numerous that, in view of the needs of the exotic trees, they have to be mainly treated as weeds. Professor Sargent finds that this low ground-cover is not only more beautiful and interesting than meadow, but it is also much more favourable to tree growth. It keeps the earth shaded and cooler than a covering of turf, and does not rob the ground of moisture so much. With the crowds that visit Kew a general treatment of the ground in this way would be impossible, but we have found that for trees rare and difficult to grow, a ground cover of heath is very advantageous, providing shade and shelter for the roots and stem without unduly robbing the soil.

In the more secluded hollows and glades Professor Sargent is developing a rich growth of ferns and shade-loving plants.

Another feature in the landscape of the Arnold Arboretum is the artistic treatment of the walks and boundary walls. Unlike Kew, the grounds are open to horse-drawn carriages (not motors) and are traversed by a system of broad, finely planned roads, which were

made and are maintained by the Park department of the city of Boston. (It may here be mentioned that in maintaining these roads, in providing police protection, and in holding the property for ever free of taxes, Boston does something towards the support of the most beautiful of its open spaces). On each side of the road and separated from it by a few feet there is a path for foot traffic. A triple track of this kind is not, of course, in itself an object of beauty, but by planting the space between the carriage drive and the footpath with a varied shrubby growth which provides usually a low irregular fringe to the footpaths, but sometimes is high enough to seclude them entirely, Professor Sargent has given them a singular charm. Through the wilder parts of the grounds grassy ways have been made which are kept closely mown to the width of a single cut of a mowing machine. Winding through the tree collections or across the hill slopes they provide the pleasantest of walking tracks.

The Arboretum is surrounded by a low wall of stone which makes an effective boundary, but is not at present high enough to exclude trespassers—as it is hoped eventually to make it. This wall is covered with a variety of climbing plants, amongst which the species of Clematis, Vitis and Celastrus are most conspicuous. These plants, which are pruned back annually in spring, had, by the time of my visit, about hidden the walls in a beautiful tangle.

The Collections.

It would, of course, be impossible to give any detailed mention of the collections of trees and shrubs. In a general way they are extremely rich in North-east American and North Asiatic species, but comparatively weak in European and West North American, whilst the floras of New Zealand and South America are scarcely, if at all, represented.

To one who has never been out of Europe before the perfect development of the native American trees naturally appeals most strongly. Especially does one admire the splendid full-grown hickories, only known as comparatively small trees in this country; the various white oaks which do not thrive at all with us, and especially the beautiful plumose branching and shapely form of the sugar maple, rarely or never seen in perfection here.

The climate of Boston, judging by its vegetation, bears about the same relation to the British Isles as that of Central Europe. The summers are much brighter and hotter; the winters much colder. In consequence, deciduous trees and shrubs flower with much greater certainty and freedom than they do in Britain, they bear fruit more plentifully, and the colouring of the decaying foliage in autumn is richer than anything ever even suggested in our climate. The climatic conditions of Boston are evidently very favourable to the growth as well as the flowering of many North Asiatic trees and shrubs. The oaks, for instance, introduced by Professor Sargent from Japan 20 years ago, such as *Q. crispula*, *Q. glandulifera*, and *Q. grosseserrata* have made splendid progress and are

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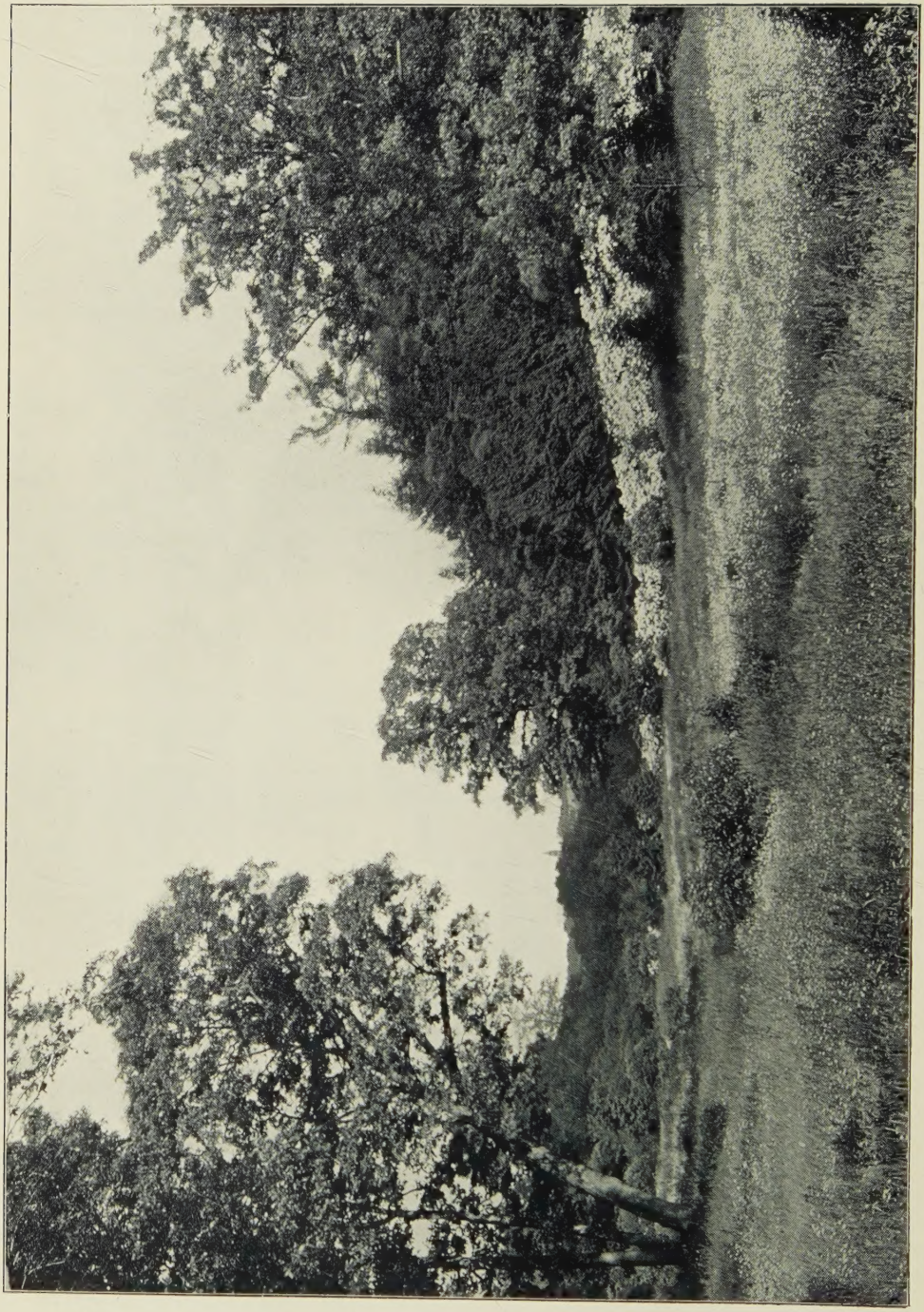

KALMIA LATIFOLIA.

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proving admirable trees. *Cercidiphyllum japonicum* which at Kew, owing to its young growth being cut back by frost once or twice every spring, has never got beyond the dimensions of a scrubby bush, is in the Arnold Arboretum represented by several vigorous cleanly-grown trees 30 to 40 feet high. The bush honeysuckles (*Lonicera*) have a value as ornamental fruiting shrubs beyond anything we ever experience. By the latter part of my stay in Boston many of them had become covered with crops of fruit beautiful in their abundance and in the translucence of their red, yellow or other colouring.

Perhaps the most noticeable difference between the general aspect of the vegetation of the Arnold Arboretum and that of English gardens is the absence of our common evergreens. Neither the holly, the yew, the ivy, the aucuba, nor the box appears to be genuinely hardy, and only a small proportion of our garden varieties of Rhododendron succeed well. The Chilian *Berberis Darwinii*, the New Zealand veronicas, the bay laurel, *Magnolia grandiflora*, the arbutuses are all too tender to be grown in the open. In the matter of evergreens as a whole English gardens have much the advantage.

Kalmia latifolia.

On the other hand such conifers and flowering evergreens as are hardy thrive exceedingly well. One of the great annual displays of the Arnold Arboretum is made by *Kalmia latifolia*. When I landed in Boston on June 16th, this shrub was in its full beauty both here and in the grounds of Professor Sargent's residence at Holm Lea. In the Arnold Arboretum it covers a sloping bank at the northern base of Hemlock Hill, forming an irregularly disposed mass perhaps 200 yards in length and 10 to 20 yards wide. There is considerable variety in the size and depth of shade of the blossom, and in the density of the flowers in the truss. With the dark masses of hemlock in the background the whole made a picture of exceeding beauty [*see* Plate]. No European visitor in the neighbourhood of Boston in mid-June should miss the sight of this splendid bank of Kalmia. Its beauty both in Professor Sargent's garden and in the Arnold Arboretum would seem to show that this shrub, although long introduced and well known, has either been neglected in Britain or that our climate generally is not so well adapted for it as it is for most evergreens. It would appear, however, that the former is the case as they are some very fine specimens in the South of England.

The botanical collection of shrubby plants is arranged in a series of long parallel borders, each border being about 8 or 10 feet wide and separated from the next by a grass walk. The shrubs are brought together in their respective genera and natural orders and there is only a single row of plants down the centre of the border. This allows each plant to stand on its own ground without interference from its neighbour, and the convenience of the student is further aided by each specimen having a label on either side. The general idea is somewhat similar to that of the arrangement of the

herbaceous plants at Kew. Considered as part of the landscape this system is not beautiful, especially in the early stages, when the plants are not fully grown and bare spaces yet await their destined occupants. But for purposes of botanical study no other arrangement is so convenient.

The collections of trees are, of course, spread over the Arboretum generally, the earlier natural orders (in the Bentham and Hooker sense) being planted at the eastern portion of the grounds near the Museum. A special consideration is paid to American trees that reach timber-producing size. With these the system is to plant (first) a number of specimens in a group close enough to develop trunks instead of side branches and thus show their timber value; and (second) a single specimen at a distance of not less than 100 feet from its companion group. This is to show its value as an isolated tree for gardens, parks, &c. [*See* Plate.]

American Thorns.

One of Professor Sargent's great tasks for some years past has been the elucidation of the North American Crataegi. It has involved an enormous labour but during the course of it he and his co-workers have been able to introduce to cultivation many new, very distinct and beautiful species. A number of dwarf bushy species are of particular interest to planters because their low, almost shrubby habit makes them suitable for places where the older thorns, from considerations of space, could not previously be grown. About fifteen acres on the eastern slope of Peter's Hill have been devoted to the type collection of American thorns. The plants have been raised from the type trees of each species and every plant has its place defined on a plan of the site, so that, in case of loss of label, its identity would be recoverable. From ten to twenty years must elapse before this collection reaches its best, but it will eventually constitute probably the most remarkable assemblage of members of a single genus in the world.

It was too late in the season to see the flowering of the rich and well-grown collection of garden varieties of lilac, but *Syringa japonica*, the noblest of the genus and a tree here over 30 feet high, was very striking in the profusion of its large pyramidal panicles of white blossom. Even with us it is a very useful small tree because of its late flowering, but it is one of the instances already alluded to where North Asiatic deciduous trees thrive much better in places where the summers are hotter than ours.

One of the great annual displays of blossom in the Arboretum is made by *Rhododendron Kaempferii*, a Japanese ally of *R. indicum* but very hardy, introduced by Professor Sargent less than 20 years ago. This and most of the other azaleas were past before my visit, but I was fortunate to find *R. arborescens*—an azalea native of the Eastern United States—fully in flower. Its flowers are white with long red stamens, and its charm is heightened by a most gracious perfume. It is curious that it is scarcely known in British gardens.

ULMUS RACEMOSA.

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Several notable hybrid roses have appeared in the Arboretum raised by Mr. Jackson Dawson. Mr. Dawson has, like Professor Sargent, seen, and helped in, the development of the Arboretum since its inception, and in regard to the outdoor department he has in a great measure played the part of builder to that of the Professor's architect. Trees now 60 feet high, he himself raised from seed, or collected as seedlings in the forests. Gifted with that peculiar understanding of plant life which enables its possessor to divine by intuition the treatment best suited to his charges and the happiest devices for increasing their number, Mr. Dawson has done much by his genius as a propagator towards making the collections so rich as they now are. He was about the first to recognise the value of *Rosa multiflora* and *R. Wichuraiana* for hybridising, and such fine roses as The Dawson, Lady Duncan, E. C. Egan and Arnoldii are the products of his skill.

I was fortunate to see a new rose in flower which Mr. Dawson has raised and called "Professor C. S. Sargent." The original plant raised in 1903 is now 8 feet high and 9 feet through, a sturdy bush with splendidly vigorous foliage. It bears large flattish trusses of semi-double flowers 3 inches across, of a delicate, apple-blossom shade, and from 30 to 50 in a truss. In June it was carrying thousands of flowers—a wonderfully beautiful picture. Its parentage is as follows: pollen bearer "Baroness Rothschild"; seed-bearer an unnamed hybrid between *R. Wichuraiana* ♀ and "Crimson Rambler" ♂. In this interesting combination the influence of *R. Wichuraiana* is only seen in the very glossy, thick, dark green foliage.

What the Arboretum has done.

From what has been said it will have been gathered that the Arnold Arboretum is filling a very important part in the advancement of arboriculture in North America and Europe. Being in one respect part of the park system of Boston, it provides a very beautiful place of resort for the people of that city. It provides also many lessons in landscape art, for there is evidence that every aspect of the grounds has been the subject of careful study in that respect. While the scientific side of the establishment necessarily dominates all others, the natural beauties of the site have not only been preserved but greatly enhanced.

Considered from the practical side, as apart from pure botany, perhaps the most notable work it has done has been the popularisation and dissemination of American trees and shrubs. Before its foundation, American gardens appear to have mainly depended for their ornamentation on plants of European origin. As an instance, I was told that 30 to 40 years ago one could not have purchased one hundred American oaks in American nurseries. The flora of the East United States has given an extraordinary number of beautiful trees and shrubs to English gardens, and in the latter half of the 18th century and the beginning of the 19th their introduction and cultivation was the chief interest of the most ardent horticulturists of the period. Many of the shrubs then introduced disappeared in course of time, and the Arnold Arboretum has done

much good work in re-introducing them. Such shrubs as *Vaccinium hirsutum*, *Rhododendron arborescens*, *Gaylussacia brachycera*, *Kalmia cuneata* and *Fothergilla major*, are a sample of the many delightful plants which have in this way been restored to us. Many quite new species have also been introduced to cultivation, whilst others, long known but rare, have been made more plentiful.

Next to the woody vegetation of his own country Professor Sargent has given most attention to that of Northern Asia. He himself has enriched American and European gardens with numerous trees and shrubs collected in Japan in the early "nineties." It would need too much space to enumerate half the things introduced through him and the institution he controls. But amongst them the following are especially noteworthy:—*Syringa japonica* and *S. pekinensis*, *Cercidiphyllum japonicum*, *Phellodendron sachalinense*, *Rhus trichocarpa*, the typical *Prunus triloba*, *P. Sargentii* and *P. subhirtella*, the oaks mentioned above, *Picea Glehnii*, *Betula Maximowiczii*, *Rhododendron Kaempferii*. On behalf of the institution in its relationship to Harvard University, two collectors, Messrs. Wilson and Purdom, are now travelling in China, and the former had previously spent two or three years there in the same work.

Whilst my object has been to indicate as briefly as possible what the Arnold Arboretum is and what it does, and to show that it is an institution which Harvard University and the City of Boston in particular, and the United States in general, have every reason to cherish and be proud of, I should not conclude without a few words in appreciation of the remarkable man who has made it, to whom it owes its splendid efficiency, and on whom its continued existence as a scientific institution has largely depended. Among the numerous qualities that are needed to make the perfect Director of a large public garden there are three that stand out as peculiarly essential. As a matter of course he should have great scientific attainments, and in these days he needs also a keen perception of landscape beauty; finally he must possess the business faculty. To few have these attributes been given in so full a degree as to Professor Sargent. No one has done a tithe as much for the advancement of knowledge in regard to North American trees and shrubs, and although now in advanced middle age, he still retains an untiring mental and physical energy. A great traveller, he has seen all but a few of the North American trees growing in their natural haunts. He has also introduced many valuable North Asiatic trees to America and thence to Europe. Free from the common craze of the collector for exclusive possession, his desire is that the plants he introduces should become widely diffused in gardens, and the limits of his generosity appear to be set only by the possession of a single plant of a kind.

The literary work of Professor Sargent commenced with the publication of the IXth Volume of the *Tenth Census of the United States* which contained a catalogue of the Forest Trees of North America, amplified by various particulars in regard to habitat, uses, sizes, &c. From 1888 to 1897 he published a weekly journal devoted to forestry and horticulture—*Garden and Forest*—which

was probably too much in advance of its period in America to be a financial success, but whose ten volumes are a mine of reliable information, especially in regard to trees and shrubs. In 1894 was published the *Forest Flora of Japan*, the outcome of Professor Sargent's travels in Japan a year or two previously.

His greatest work, however, and the one on which his literary fame will most endure, is the *Silva of North America*, a magnificent work in quarto of 14 volumes, giving one or more portraits, a description, and much historical and other information about every tree of timber-producing size in North America exclusive of Mexico. A very successful work is the *Manual of the Trees of North America*, to some extent an abridgment of the *Silva*.

At the present time there is being issued at intervals a quarto publication called *Trees and Shrubs* giving illustrations and descriptions of new or little known ligneous plants. Since the publication of the *Silva*, however, the most laborious undertaking under the auspices of Professor Sargent and the Arnold Arboretum is a complete *Bibliography of the Trees and Shrubs of the World* up to 1900, which is now in the hands of the printer. This work will consist of four quarto volumes and will run to 4000 pages. It gives all references to the published literature of any value in all languages dealing with the woody plants of the globe. By its means the student will be furnished with a complete guide to all the authoritative printed information about any known tree or shrub up to the beginning of the present century.

Explanation of Plates.

I.—A flowery meadow, with *Kalmia latifolia* in blossom, and a spur of Hemlock Hill covered with *Tsuga canadensis* in the background.

II.—The Rock Elm (*Ulmus racemosa*), showing the system of planting a number of specimens of one species in a group with a single isolated one 100 feet or more away.

XXXVIII.—NEW IMPATIENS FROM CHINA.

J. D. Hooker.

In April of the present year Prof. C. S. Sargent, Director of the Arnold Arboretum, Boston, U.S.A., placed in my hands for examination and subsequent transference to the Herbarium of the Royal Botanic Gardens, Kew, ten species of *Impatiens* found by the celebrated traveller and collector Mr. E. H. Wilson in China, during his second botanical mission to that country in 1908. Of these the following six are new to me, raising the number of Chinese species

of which I have MSS. or published descriptions to upwards of one hundred and seventy.

Clavis specierum novarum.

(*Folia in omnibus alterna; inflorescentia pedunculata; labellum calcaratum*).

Pedicelli omnes basi bracteati.
Sepala 2.
Alarum auricula dorsalis normalis vel 0.
Pedunculi pluriflori ; vide etiam no. 7, *I. desmantha.*
Folia 1–2 dm. longa ; flores majusculi, flavi ; sepala plana, distorta, apice hilo instanti ; antherae acutae. 1. *I. tortisepala.*
Folia 4–8 cm. longa, breviter petiolata ; flores parvi, straminei ; sepala ovato-rotundata, obtusa ; antherae acutae. 2. *I. microstachys.*
Pedunculi 1-flori, brevissimi ; vide quoque no. 9, *I. pterosepala.*
Folia 6–10 cm. longa, longe petiolata, grosse crenata ; sepala orbicularia ; alarum lobus basalis longe cuspidatus. 3. *I. brevipes.*
Alarum auricula dorsalis filiformis, calcare labelli inclusa ; vide quoque no. 10, *I. Faberi.*
Folia 5–10 cm. longa ; pedunculi 2-flori ; flores rosei ; sepala late ovata ; labelli calcar breve ; antherae acuminatae. 4. *I. distracta.*
Sepala 4.
Folia 3–4 cm. longa, ovata, serrulata ; flores majusculi, roseo-purpurei ; sepala exteriora lineari-lanceolata ; labellum inflatum. 5. *I. gasterocheila.*
Pedicelli medio tantum bracteati ; vide quoque no. 8, *I. corchorifolia.*
Folia 3–5 cm. longa, oblonga, crenata, basi rotundata vel cordata ; flores parvi, rosei ; bracteae orbiculares, sessiles, dentatae, persistentes ; antherae acutae. 6. *I. latebracteata.*

1. **I. tortisepala**, *Hk. f.*, sp. nov.

Szechuan occident. Huang Yah, alt. 1500–1800 m., locis humidis, *E. H. Wilson* in Herb. Arnold Arboret., no. 3061, et Kew.

Herba elata, glaberrima, grandifolia, mediocriflora, caule ramoso. *Folia* 1–2 dm. longa, alterna, submembranacea, oblonga vel ovato-oblonga, acuminata, crenata setulis interjectis 0, basi rotundata, serrata, utrinque 6–7-nervia, costa nervisque gracilibus ; glandulae infrapetiolares 0. *Inflorescentia* pedunculata ; pedunculi 6–7 cm. longi, suberecti, 6–8-flori ; pedicelli florentes 3–4 cm. longi, fructiferi patuli, paullo longiores ; bracteae subulatae, 2–4 mm. longae. *Flores* ad 4 cm. expansi, flavi ; raphides 0. *Sepala* 2, reniformi-rotundata, plana, torta, apice nunc producta hilum fere attingente, 5 mm. diametro, membranacea. *Vexillum* rotundato-reniforme, 1·5 cm. latum, costa dorso carinata apice rostellata. *Alae* 2–2·5 cm. longae, late stipitatae ; lobus basalis parvus, rotundatus, breviter calcaratus, distalis ter longior, dolabriformis, apice rotundatus ; auricula dorsalis parva, inflexa. *Labelli* limbus saccatus, ad 2 cm. longus, in calcar robustum incurvum apice

clavatum abrupte attenuatus, ore ultra medium ascendente erecto acuto. *Filamenta* brevia, lata ; antherae ovatae, acutae. *Ovarium* fusiforme, rectum, acutum. *Capsulae* lineares, 4–5 cm. longae, rectae, acutae, polyspermae. *Semina* oblonga vel obovoidea, compressa, 4 mm. longa, laevia, castanea.

A handsome species the curious sepals of which can only be described as more or less broadly reniform, being curved in a plane with the stoutly beaked apex lateral or close to the hilum. More specimens will probably show great variability in the sepals.

2. I. microstachys, *Hk. f.*, sp. nov.

Szechuan occident. Huang Yah, alt. 1500–1800 m., *E. H. Wilson* in Herb. Arnold Arboret., no. 3067, et Kew.

Herba gracilis, glaberrima, parviflora, caule laxe ramoso. *Folia* 4–8 cm. longa, alterna, breviter petiolata, firma, ovata vel ovato-oblonga, acuminata, crenata vel crenato-serrata, basi acuta, utrinque 6–7-nervia, petiolo 0·5–1·5 cm. longo nudo vel 1–3-glanduloso ; glandulae infrapetiolares 0. *Inflorescentia* pedunculata ; pedunculi foliis subaequilongi vel longiores, filiformes, patuli vel decurvi, 3–5-flori, subflexuosi ; pedicelli florentes 0·5–1 cm. longi, fructiferi duplo longiores ; bracteae minimae, setaceae. *Flores* vix 1 cm. expansi, pallide flavi ; raphides 0. *Sepala* 2, ovato-rotundata, obtusa, membranacea, 5-nervia. *Vexillum* orbiculare, ad 6 mm. diametro, utrinque intrusum, costa gracili mutica. *Alae* breves, sessiles, ad 5 mm. longae et latae ; lobus basalis rotundatus, distalis paullo minor ; auricula dorsalis 0? *Labellum* 1·3–1·5 cm. longum ; limbus subinfundibuliformis, in calcar limbo triplo longius apice incurvum sensim attenuatus, ore horizontali acuto. *Filamenta* linearia ; antherae acutae. *Ovarium* fusiforme, rectum, acuminatum, 5-gonum. *Capsulae* erectae, 2 cm. longae, lineares, rectae vel lente curvae, acuminatae, 5-gonae, 5-spermae. *Semina* ellipsoidea, 3–3·5 mm. longa, glabra, fusco-castanea, nitida.

3. I. brevipes, *Hk. f.*, sp. nov.

Szechuan occident. Wa-shan, alt. 1500–1800 m., *E. H. Wilson* in Herb. Arnold Arboret., no. 3059, et Kew.

Herba glaberrima, 5 dm. alta, paucifoliata, floribus mediocribus, caule simplice inferne longe nudo robusto superne remote foliato. *Folia* 6–10 cm. longa, alterna, longe graciliter petiolata, membranacea, ovata, caudatim acuminata, grosse crenata setulis interjectis 0, basi rotundata vel cuneata, nuda vel glandulifera, petiolo 3–5 cm. longo, nervis utrinque 5–7 ; glandulae infrapetiolares 0. *Inflorescentia* pedunculata, pedunculo brevissimo unifloro, bractea subulata. *Flores* ad 3 cm. expansi ; raphides 0. *Sepala* 2, orbicularia, 1·2 cm. diam., 7-nervia, costa carinata cuspidata. *Vexillum* orbiculare, fornicatum, costa dorso ala lata instructa mutica. *Alae* late stipitatae, 2·7 cm. longae ; lobus basalis orbicularis, in cuspidem elongatum crispatum angustatus, totus 4 cm. longus, distalis duplo major, late dolabriformis ; auricula dorsalis magna, inflexa. *Labelli* limbus infundibularis, 3 cm. longus, in calcar limbo dimidio brevius incurvum alte fissum attenuatus, ore lato ascendente acuminato. *Filamenta* brevia ; antherae didymae. *Ovarium* angustum, strictum, acuminatum, 5-gonum.

Described from a single specimen which may not represent the normal habit of the plant, together with a single expanded flower. The structure of the basal lobe of the wings with its long acuminate crisped apex is that of the N. Chinese and Japanese *I. Textori*, in which the peduncle is many-flowered.

4. **I. distracta**, *Hk. f.*, sp. nov.

Szechuan occident. Huang Yah, locis humidis, alt. 1500–1800 m., *E. H. Wilson* in Herb. Arnold Arboret, no. 3060, et Kew.

Herba fere glaberrima, gracilis, ramosa, floribus inter minores, ramis elongatis. *Folia* 5–10 cm. longa, apices versus ramorum conferta, sessilia, inferiora alterna, petiolata, membranacea, ovato-oblonga, acuminata, crenata vel crenato-serrata setulis interjectis 0, suprema basi rotundata, inferiora basi cuneata petioloque gracili 3–4 cm. longo instructa; nervi utrinque 6–7, graciles; glandulae infrapetiolares 0. *Inflorescentia* pedunculata; pedunculi graciles, 2–3 cm. longi, biflori, glabri, pilosuli; pedicelli florentes breves, fructiferi divaricati, 0·5–3 cm. longi, inferior basi, superior supra basin bracteati; bracteae lanceolatae, 3–5 mm. longae. *Flores* ad 2 cm. expansi, roseo-purpurei; raphides 0. *Sepala* 2, ovata, cuspidatim acuminata, 7 mm. longa, 3-nervia, glabra vel pilosa. *Vexillum* orbiculare, 1·4 cm. diametro, basi intrusum, apice rotundatum, costa dorso late alata, ala apice rostrata. *Alae* sessiles, 2–2·5 cm. longae; lobus basalis parvus, rotundatus vel decurvus, ambitu purpureus, distalis multo major, dolabriformis, dorso infra apicem saepe late excisus; auricula dorsalis in filum lamina dimidio brevius in calcar labelli descendens productus. *Labelli* limbus cymbiformis, ascendens, 1·5 cm. longus, acutus, basi in calcar crassum obtusum paullo incurvum limbo brevius attenuatus. *Filamenta* brevissima, lata; antherae subacutae. *Ovarium* fusiforme, rectum, acutum. *Capsulae* lineares, 3–4 cm. longae, teretes, acuminatae, rectae vel falcatae, polyspermae. *Semina* ovato-oblonga, 3·5–4 cm. longa, glabra, fusca.

Closely allied to *I. Faberi*, but differing in the short spur and dorsal auricle of the wings, 2-flowered peduncle, &c.

5. **I. gasterocheila**, *Hk. f.*, sp. nov.

Szechuan occident. Wa-shan, secus rivulos, alt. 900 m., *E. H. Wilson* in Herb. Arnold Arboret., no. 3062, et Kew.

Herba gracilis, glaberrima, 4 dm. alta, mediocriflora, caule subsimplici inferne longo nudo. *Folia* 3–4 cm. longa, alterna, longe petiolata, membranacea, ovata, acuminata, serrulata, basi cuneata in petiolum gracilem 2–3 cm. longum breviter angustata, costa nervisque utrinque 6–7 tenuibus; glandulae infrapetiolares 0. *Inflorescentia* pedunculata; pedunculi graciles, uniflori, florentes 1–1·5 cm. longi, fructiferi duplo longiores; bracteae paucae, sparsae, capillares, 1–3 mm. longi. *Flores* ad 2 cm. expansi, roseo-purpurei; raphides 0. *Sepala* 4, uninervia, 2 exteriora lineari-lanceolata, 7 mm. longa, longe acuminata, 2 interna basi vexilli opposita, 4 mm. longa, linearia, acuta. *Vexillum* orbiculare, fornicatum, 1·2 cm. diametro, costa dorso anguste alata mucronata. *Alae* late stipitatae, 1·8–2 cm. longae; lobus basalis oblongus, subacutus, distalis dimidio longior, obovato-oblongus; auricula dorsalis parva, inflexa. *Labellum* inflatum,

incurvum, 1·5 cm. longum, calcare brevi erecto instructum, ore scaphiformi, horizontali, longe acuminatum. *Filamenta* brevia, linearia ; antherae majusculae, didymae. *Ovarium* fusiforme, strictum, acuminatum. *Capsulae* erectae, lineares, 2 cm. longae, utrinque acuminatae, strictae, oligospermae. *Semina* late ovoidea vel globosa, compressa, 2·5 mm. longa, laevia, fusca.

A very singular species, with rose-purple flowers difficult of analysis and description. The very slender one-flowered peduncles may easily be mistaken for simple pedicels, so small are the capillary bracts. The incurved inflated tip is of the saccate type and probably varies greatly in form.

6. I. latebracteata, *Hk. f.*, sp. nov.

Szechuan occident. Huang Yah, locis humidis, alt. 1200–1800 m., *E. H. Wilson* in Herb. Arnold Arboret., no. 3066, et Kew.

Herba elata, gracilis, glaberrima, caule ramoso ramisque distanter foliatis. *Folia* 3–5 cm. longa, alterna, suprema sessilia, firma, oblonga vel ovato-oblonga, obtusa, crenata setulis interjectis 0, basi rotundata vel cordata, nervis utrinque 6–7 costaque gracillimis, petiolo 0·5–3 cm. longo gracili ; glandulae infrapetiolares 0. *Inflorescentia* pedunculata ; pedunculi foliis breviores, graciles, 2–5-flori ; pedicelli 0·5–1 cm. longi, medio bracteati ; bracteae orbiculares, sessiles, 3–4 mm. diametro, dentatae, persistentes. *Flores* ad 1 cm. expansi, flavi ; raphides 0. *Sepala* 2, late ovata, obtusa, 6–8 mm. longa, inaequilatera, membranacea, 4–5-nervia. *Vexillum* orbiculare, fornicatum, dorso tumidum, muticum. *Alae* sessiles, 1·5–1·7 cm. longae ; lobus basalis rotundatus vel late oblongus, distalis triplo major, dolabriformis, apice rotundatus ; auricula dorsalis inflexa. *Labellum* infundibulare, ab ore subhorizontali sensim attenuatum, totum incurvum, ad 2 cm. longum. *Filamenta* brevissima, lata ; antherae late ovatae, acutae. *Ovarium* fusiforme, acuminatum, rectum. *Capsulae* 1·5–2 cm. longae, erectae, anguste ellipsoideae, utrinque attenuatae, acutae, oligospermae. *Semina* oblonga vel obovoidea, 4–4·5 mm. longa, fere laevia, fusco-castanea.

The remarkably large, orbicular, sessile, toothed bracts on the middle of the pedicels are totally dissimilar to those of any other Asiatic species known to me.

The following four species in Mr. Wilson's collection were known to me from specimens obtained by earlier travellers ; they are :—

7. I. desmantha, *Hk. f.* in Nouv. Archiv. Mus. Hist. Nat. Paris, ser. 4. x. (1908) 248.

Szechuan occident. Tatienlu bor. orient., locis humidis, alt. 2280 m., *E. H. Wilson* in Herb. Arnold Arboret., no. 3056, et Kew.

Primum in sylvis San-tcha-no prov. Yunnan ab *Abbate Delavay* detecta ; recentius in Mont. Tali alt. 2400–2700 m., a *G. Forrest*, no. 4274 et in Mont. Lichiang, alt. 2850–3300 m. collecta.

The Szechuan specimens have longer points to the leaves than those from Yunnan.

8. I. corchorifolia, *Franch.* in Bull. Soc. Bot. France xxxiii (1886), 443 ; Hk. f. in Nouv. Archiv. Mus. Hist. Nat. Paris, ser. 4, x. 261.

Szechuan occident. Wa-shan, alt. 1500–1800 m., *E. H. Wilson* in Herb. Arnold Arboret., no. 3064, et Kew.

Primum in sylvis montis Ki-chan, prope Tali, alt. 2800 m., ab *Abbate Delavay*, no. 1149, detecta; recentius ab *Aug. Henry*, no. 11,304, et *G. Forrest*, no. 601, collecta.

9. I. pterosepala, *Hk. f.*, sp. nov.

Hupeh occident. Heang-shan, alt. 1200 m., *E. H. Wilson* in Herb. Arnold Arboret., no. 3068, et Kew.

Praevius in Hupeh ab *Aug. Henry*, no. 6551 et no. 7419, et *E. H. Wilson*, no. 2692, collecta.

Herba 6–9 dm. alta, gracilis, ramosa, glaberrima, floribus inter minores. *Folia* 3–10 cm. longa, alterna, membranacea, ovata, acuminata, serrata vel crenato-serrata, basi acuta et saepissime glandulis 2 magnis globosis aucta, in petiolum nudum vel glandulosum gracile 1–3 cm. longum angustata, nervis utrinque 5–7; glandulae infrapetiolares 0. *Inflorescentia* pedunculata; pedunculi 2–3 cm. longi, graciles, uniflori; bracteae solitariae, setaceae. *Flores* 2–2·5 cm. expansi, roseo-purpurei; raphides 0. *Sepala* 2, anguste ovata vel ovato-oblonga, subacuta, 6–7 mm. longa, inaequilatera, nunc uno latere minute denticulata, costa dorso crasse alata. *Vexillum* orbiculare, 1·2 cm. diametro, fornicatum, basi bilobum, apice muticum, costa dorso late vel anguste alata, ala integra vel biloba. *Alae* subsessiles, 1·5 cm. longae; lobus basalis parvus, oblongus vel subquadratus, distalis multo major, dolabriformis, vel semilunaris, nunc 1·4 cm. latus, apice rotundatus; auricula dorsalis brevis vel elongata, inflexa. *Labellum* corniforme, ad 2–2·5 cm. longum, ab ore ascendente acuto sensim attenuatum. *Filamenta* linearia; antherae didymae, obtusae. *Ovarium* fusiforme, rectum, acutum, 5-gonum. *Capsulae* anguste lineares, erectae, acuminatae, strictae, 3–4 cm. longae, oligospermae. *Semina* oblonga, 2·5 mm. longa, glabra, nitida, castanea.

10. I. Faberi, *Hk. f.*, sp. nov.

Szechuan occident. Wa-shan, alt. 1500–2100 m., *E. H. Wilson* in Herb. Arnold Arboret., no. 3063, et Kew.

Primum in Mt. Omi ab *Abbate Faber*, alt. 1350 m. detecta, ex *Aug. Henry*, no. 867, postea ab *E. H. Wilson*, no. 4734.

Herba elata, ramosa, fere glaberrima, mediocriflora, caule ramisque foliosis gracilibus. *Folia* 0·5–1·5 dm. longa, alterna, sessilia vel breviter petiolata, sat firma, elliptica, oblonga vel lanceolata, acuminata, serrata, serrulata vel crenato-serrata, basi acuminata, raro in petiolum 2–4 cm. longum angustata, nervis utrinque 5–8; glandulae infrapetiolares 0. *Inflorescentia* pedunculata; pedunculi 5–10 cm. longi, graciles, erecti, glabri vel puberuli, 2–6-flori; pedicelli florentes 1–3 cm. longi, fructiferi paullo longiores: bracteae 2–3 mm. longae, lanceolatae, deciduae. *Flores* 3 cm. longi, ad 2 cm. expansi, roseo-purpurei; raphides 0. *Sepala* 2, ovata, acuminata, 6–8 cm. longa, 3 5-nervia, viridia, costa crassa. *Vexillum* orbiculare, 1·3–1·7 cm. latum, basi profunde bilobum, apice emarginatum vel bilobum, muticum, costa dorso crasse alata nunc medio tantum gibba vel cornuta. *Alae* sessiles, 2–2·5 cm. longae; lobus basalis rotundatus, distalis major, dolabriformis; auricula dorsalis in filum gracile calcare labelli inclusum producta. *Labellum* corniforme, 3–4 cm. longum, ab ore ascendente dilatato rotundato

apiculato sensim attenuatum, a medio incurvum vel rectum. *Filamenta* brevissima, lata; antherae subacutae. *Ovarium* fusiforme, rectum, acutum, pentagonum. *Capsulae* 2·5–3 cm. longae, anguste lineares, erectae, strictae, acuminatae, oligospermae. *Semina* oblonga, 4 mm. longa, laevia, castanea.

Two species may be included in the above description. In Faber's specimens the leaves are much the largest, the peduncles 2-flowered, the basal lobe of the wings large, and the lip incurved; in Wilson's from Wa-shan, the peduncles are 2–6-flowered, the basal lobe of the wing very small, the distal broad, and the lip straight.

XXXIX.—DECADES KEWENSES

Plantarum Novarum in Herbario Horti Regii, Conservatarum.

DECAS LVIII.

571. **Alsodeia (Pentaloba) Murtonii**, *Craib* [Violaceae-Alsodeicae]; affinis *A. echinocarpae*, Korth., sed foliis supra glabris subtus haud pubescentibus serrulatis, floribus minoribus, petalis hastatis differt.

Ramuli teretes, juventute strigillosi, mox glabri, cortice cinereo obtecti. *Folia* alterna, oblanceolata, acute acuminata vel caudato-acuminata, basi cuneata, 10–15 cm. longa, 3–4 cm. lata, remote serrulata, membranacea, utrinque glabra nisi nervis subtus parcissime setulosa, nervis lateralibus utrinque circiter 12 obliquis intra marginem arcuatis supra conspicuis subtus cum nervis transversis prominentibus; petioli circiter 7 mm. longi; stipulae rigidae, lineari-lanceolatae, circiter 5 mm. longae, deciduae. *Cymae* axillares, sessiles, apices ramulorum versus confertae, compactae, petiolis subaequales. *Sepala* late ovata, obtusa, 2 exteriora maxima 3 mm. longa, 2·5 mm. lata, utrinque extus densius pubescentia, ciliata. *Petala* hastata, sub anthesin apice recurvo, 3·5 mm. longa, 1·5 mm. lata, ungui fere 1·5 mm. longo extus medio intus apicem versus pubescentia. *Discus* ovario aequialtus, glaber, margine crenato stamina gerens. *Filamenta* longiuscula, connectivo in appendicem obtriangularem margine subintegro producto. *Ovarium* vix 1 mm. altum, pilosum, circiter 6-ovulatum; stylus cylindricus, stamina paulo superans, parce pilosus.

Indo-China. Siam: Koh Klone, *Murton*, 15.

This is *A. macrophylla*, Williams, Bull. Herb. Boiss. V. (1905) p. 24 e.p.; H. de Boissieu, Fl. Gen. Indo-Chine, I. 3. p. 217 e.p.; non Decne. The other specimen quoted by Williams and de Boissieu ll. cc. under *A. macrophylla*, viz. *Murton*, 72, belongs to the section *Prosthesia* and comes very near to *A. membranacea*, King, a native of Perak. It is possible that *Murton*, 72, may be the *A. membranacea* of Fl. Gen. Indo-Chine.

572. **Hibiscus glanduliferus**, *Craib* [Malvaceae-Hibisceae]; affinis *H. tiliaceo*, Linn., sed foliis duplo-dentatis, supra hispidis, petiolis glandis majusculis apice ornatis differt.

Caules e radice perenni, annui, circiter 1·2 m. alti (*ex Kerr*), teretes, tomentelli. *Folia* orbicularia vel juniora ovato-lanceolata, apice acuminata, basi cordata nisi juniora rotundata vel cuneata, ad

15 cm. longa, 13·5 cm. lata, duplo-dentata, firme chartacea, supra hispida, subtus laxe tomentosa, nervis primariis e basi circiter 7, secundariis e costa ortis, utrinque plerumque 3, omnibus cum venis transversis supra conspicuis subtus prominentibus ; petioli ad 10 cm. longi, 3 mm. diametro, tomentelli, supra canaliculati, subtus apice glandula instructi ; stipulae lanceolatae vel ovatae, deciduae, 1–1·3 cm. longae, 2·5–9 mm. latae. *Flores* solitarii, axillares, ramulorum apices versus conferti ; pedicelli vix 1 cm. longi, crassi. *Bracteolae* 10, connatae ; tubus 4–6 mm. longus ; lobi subaequales, lanceolatae, apice interdum bifidi, ad 11 mm. longi et fere 5 mm. lati. *Calycis* tubus 1 cm. longus, apice 2 cm. diametro ; lobi 5, ovato-lanceolati, acuti, 1·5–2·8 cm. longi, basi 1 cm. lati ; bracteolarum calycisque indumentum ut in caule. *Petala* 5, obovata, apice truncata, usque ad 6 cm. longa, 4·5 cm. lata, utrinque parce pubescentia, nervis distinctis, sulphurea nisi basi brunnea (*ex Kerr*). *Stamina* ∞, in columnam glabram vix e basi antheriferam circiter 2 cm. longam connata. *Ovarium* densissime pilosum ; styli rami dense papillosi, subconnati. *Fructus* globosus, apiculatus, circiter 2 cm. diametro, dense flavo-hirsutus.

Indo-China. Siam : Chiengmai, in Eng jungle on Doi Sootep, 300–600 m., *Kerr*, 778.

573. **Uraria Lacei**, *Craib* [Leguminosae-Hedysareae] ; affinis *U. paniculatae*, Clarke, sed multo robustior, bracteisque majoribus valde imbricatis distincta.

Fruticulus circiter 1·5 m. altus. *Caules* ferrugineo-tomentosi, teretes, plus minusve sulcati, ad 6 mm. diametro. *Folia* pinnatim trifoliolata ; foliola ovato-lanceolata, apice obtusa, mucronata, basi rotundata, lateralia obliqua, 10 cm. longa, 4–5 cm. lata, terminalia a lateralibus 1·3–2 cm. distantia, 12 cm. longa, 6 cm. lata, margine crenata, chartacea, supra pilis basi incrassatis hispidula, subtus pilosa, nervis lateralibus utrinque circiter 13 ad marginem excurrentibus supra conspicuis subtus prominentibus ; petioli 2–3·5 cm. longi, tomentosi, supra canaliculati, basi incrassati ; stipulae e basi 4 mm. lata subulato-filiformes, circiter 1 cm. longae, striatae ; petioluli 3–4 mm. longi ; stipellae 4 mm. longae, circiter 0·5 mm. latae. *Panicula* terminalis, 42 cm. longa, 20 cm. lata ; rachis ramulique divergentes ferrugineo-tomentosi, et praeterea, praesertim juventute, albo-villosi. *Bracteae* dense imbricatae, ante anthesin caducae, ovato-acuminatae, 7 mm. longae, 5 mm. latae, utrinque extus densius sericeo-pubescentes. *Pedicelli* graciles, circiter 7 mm. longi. *Calyx* circiter 4 mm. longus, lobis lanceolatis acutis tubo subaequilongis, 2 supremis brevioribus pilis basi tuberculatis parce instructis. *Vexillum* 6·5 mm. longum ; alae carina paulo breviores ; carina 8 mm. longa. *Stamina pistillumque* generis. *Legumen* immaturum articulis 6, fere glabrum.

Indo-China. Burma : Maymyo Plateau, 1050 m., *Lace*, 4325 ; Manipur : Laimatak, 900–1200 m., *Meebold*, 6245.

China. Yunnan : Puerh, 1350 m., *Henry*, 9144c.

574. **Pueraria alopecuroides**, *Craib* [Leguminosae-Phaseoleae] ; ab omnibus speciebus adhuc descriptis inflorescentia alopecuroidi facile distinguenda.

Suffrutex scandens ; ramuli ferrugineo-hirsuti, ad 6 mm. diametro. *Folia* pinnatim trifoliolata ; foliola late ovata, caudato-acuminata, mucronata vel juniora sensim ad apicem acutum attenuata, basi rotundata, lateralia obliqua, 8·5–15 cm. longa, 5–10 cm. lata, foliolum terminale a lateralibus 3–6·5 cm. distans, 10·5–15 cm. longum, 6·5–12 cm. latum, margine crenata, membranacea, supra parce pilosa, subtus juventute appresse pilosa, nervis lateralibus utrinque 6–8 ad marginem excurrentibus supra conspicuis subtus cum nervulis prominentibus ; petioli 10–20 cm. longi, parce ferrugineo-hirsuti, supra canaliculati ; stipulae medio affixae, sagittatae, 2·2 cm. longae, 8 mm. latae, striatae ; petioluli 0·5–1 cm. longi ; stipellae lineari-lanceolatae petiolulos paulo superantes, striatae. *Inflorescentia* racemoso-paniculata, axillaris, ante anthesin densissima, alopecuroides, ut visa 22 cm. longa ; ramuli 10 cm. longi, basi bractea stipulis simillima instructi ; bracteae lanceolatae vel lineari-lanceolatae, acutae, circiter 1·3 cm. longae, alabastra superantes, pilis longis rigidulis ferrugineis instructae ; pedicelli 5 mm. longi, bracteolis 2 circiter 5·5 mm. longis. *Calyx* campanulatus, puberulus et praeterea pilis ferrugineis longis instructus ; tubus 3 mm. longus ; lobi lanceolati, acuti, 2 superiores connati, 5 mm. longi, laterales fere 4 mm. longi, lobus inferior 6 mm. longus. *Vexillum* suborbiculatum, emarginatum, fere 1 cm. longum et latum, basi auriculis inflexis appendiculatum, ungue 2·5 mm. longo. *Alae* oblongae, longe appendiculatae, carinam paulo superantes. *Carina* 1 cm. longa, obtusa. *Stamina* medio connata, vexillare ima basi liberum ; antherae uniformes. *Ovarium* sessile, 7 mm. altum, parcissime pilosum, circiter 6-ovulatum ; stylus superne inflexus, stigmate parvo terminali brevissime penicellato.

Indo-China. Upper Burma : Shan Hills, Gokteik, 600 m., *Meebold*, 8058.

China. Southern Yunnan : Szemao, *Bons d'Arty*, 255.

575. Dunbaria longeracemosa, *Craib* [Leguminosae-Phaseoleae] ; affinis *D. bellae*, Prain, sed racemis multo longioribus et foliolis majoribus apice obtusis vel subacutis differt.

Frutex scandens ; ramuli puberuli, teretes, striati, cortice pallide rubro-brunneo. *Folia* pinnatim trifoliolata, ad 18 cm. longa ; foliola oblique oblonga vel oblongo-elliptica, apice obtusa vel subacuta, basi rotundata vel cuneata, 5–13·5 cm. longa, 1·5–5 cm. lata, margine integro leviter recurvo, chartacea, supra pilis brevibus scabridula, subtus pilosa et glandulis parvis rubris ornata, trinervata, nervis secundariis (e costa ortis) utrinque circiter 5, nervis omnibus cum nervulis supra conspicuis subtus prominentibus ; rhachis communis usque ad 8 cm. longa, supra canaliculata ; petioluli 2–3 mm. longi ; stipulae deciduae ; stipellae minutissimae vel deficientes. *Racemi* breviter pedunculati usque ad 5·8 dm. longi, laxi ; pedicelli plerumque geminati, circiter 5 mm. longi, bracteis deciduis. *Calyx* puberulus, gibbosus, tubo 5 mm. longo, 4 mm. diametro ; lobi 4, tubo breviores, infimo lanceolato longissimo, ciliati. *Corolla* longe exserta ; vexillum rubro-brunneum, suborbiculatum, 1·3 cm. longum, 1·5 cm. latum, ungui 3·5 mm. longo, basi appendiculatum ; alae oblique oblongo-obovatae, 1·2 cm. longae, carinae medio adhaerentes ; carina sulphurea, incurva, apice obtusa alis subaequialta. *Stamen*

vexillare omnino liberum ; antherae uniformes. *Ovarium* sessile, 7 mm. altum, densissime glandulosum, pluri-ovulatum ; stylus circiter 1·5 cm. longus, superne glaber, apice dilatato. *Legumen* (vix maturum) lineare, rectum, 7 cm. longum, 8 mm. latum, velutinum et glandulosum.

INDO-CHINA. Siam ; Chiengmai, in deciduous jungle on Doi Sootep, 300–900 m., *Kerr*, 917 ; Kan Phra Dang, *Hosseus*, 148.

576. **Oldenlandia Prainiana**, *Craib* [Rubiaceae-Hedyotideae] ; inter species indicas adhuc descriptas habitu et inflorescentia facile distinguenda.

Herba diffuse ramosa, flaccida, laxe pilosa. *Folia* ovata vel ovato-lanceolata, apice obtusa vel subacuta, basi cuneata, 4–7 mm. longa, 2–4·5 mm. lata ; petioli 1–3 mm. longi ; stipulae minutissimae, subulatae. *Flores* solitarii, axillares vel terminales, albi vel roseo-albi. *Receptaculum* 1 mm. longum. *Calycis* lobi 4–5, lanceolati, acuti, interdum inaequales, receptaculo aequilongi. *Corollae* tubus gracilis, 7 mm. longus, 0·5 mm. diametro, extra glaber, fauce pilosa ; lobi ovati, subacuti, 2 mm. longi. *Stamina* 4, fauci inserta ; filamenta brevia, glabra ; antherae exsertae, oblongae, 1·5 mm. longae. *Stylus* filiformis, stigmatis ramis 2 brevibus. *Fructus* didymus, pilosus, loculicide dehiscens ; semina nigra, minuta, angulata, foveolata.—*Anotis Prainiana*, Talbot mss. in Herb. Kew.

INDIA. Mysore : Bababudan Hills; Santaveri, 1500 m., *Talbot*, 2995 ; Kulhutty, *Meebold*, 4887.

577. **Hoya fuscomarginata**, *N. E. Brown* [Asclepiadaceae-Marsdenieae] ; affinis *H. Pottsii*, Traill, sed foliis multo majoribus acutis vel gradatim subacuminatis nec abrupte acuminatis, petiolis crassioribus, corolla ochracea vel flavo-virente et coronae lobis purpureo-tinctis facile distinguitur.

Folia crasse carnosa ; lamina 17–22 cm. longa, 7–8 cm. lata, ovato-lanceolata, interdum leviter obliqua, acuta vel gradatim subacuminata, obtusa vel subcuneata, 3–5-nervia, glabra, viridia, marginibus fuscis ; petiolus 2·5–4·5 cm. longus, 7 mm. crassus, cinereus. *Umbelli* multiflori. *Pedunculi* 3·5–4·5 cm. longi, 2·5 mm. crassi. *Pedicelli* graciles, 2 cm. longi. *Sepala* minuta, 1 mm. longa, ovata, acuta, ut pedicelli et pedunculi parce et minutissime puberula. *Corolla* rotata, 1·2–1·3 cm. diametro, glabra, ochracea vel flavo-virens, lobis 5 mm. longis et latis late ovatis abrupte breviter acuminatis patentibus apice recurvis. *Coronae* lobi 3·5 mm. longi, stellato-patentes, ovati, utrinque acuti, leviter purpureo-tincti.

Origin unknown. It was purchased in Brussels by Mr. F. W. Moore of the Royal Botanic Gardens, Glasnevin, from Mr. Pauwels, who stated that it had been imported with Orchids from British Guiana. But it can scarcely be a native of that country, as no species of *Hoya* is known to inhabit America.

578. **Strobilanthes (Acanthopale) Meeboldii**, *Craib* [Acanthaceae-Ruellieae]; ex affinitate *S. ixiocephali*, Benth., sed spicis bracteisque multo minoribus haud glanduloso-pubescentibus differt.

Fruticulus haud gregarius, circiter 1 m. altus ; ramuli teretes, glabri, nodis incrassatis. *Folia* ovata vel ovato-lanceolata, longe acuminata, apice obtusa, basi inaequalia, cuneata, petiolo paullo decurrentia, 5·5–13·5 cm. longa, 2·5–5 cm. lata, crenato-serrata,

chartacea, margine ciliato excepto glabra, superne lineolata, nervis lateralibus utrinque 5–7 obliquis supra conspicuis subtus prominentibus, nervulis supra vix conspicuis subtus prominulis; foliorum oppositorum petioli valde inaequales, 1–5 cm. longi, fere glabri, supra canaliculati, basi incrassati. *Spicae* racemis axillaribus dispositae, ad 1·5 cm. longae, circiter 7·5 mm. diametro. *Bracteae* sub anthesin persistentes, late ovatae vel ovato-lanceolatae, apice obtusae vel breviter obtuse acuminatae, ad 5 mm. longae, 3 mm. latae; bracteolae 2, lineares fere 5 mm. longae ut bracteae ciliatae. *Calyx* 5-partitus, segmentis lanceolatis apice subacutis 6·5 mm. longis 1·5 mm. latis ciliatis et nigro-punctatis. *Corolla* longe exserta, campanulato-infundibuliformis, parte basi cylindracea parti ventricosae subaequali, circiter 1·2 cm. longa, extus glabra, intus pilosa. *Stamina* 4, didynama, longe exserta, 0·7–1·2 cm. longa. *Ovarium* glabrum; stylus stamina longiora aequans. *Fructus* ignotus.

India. Mysore: Kempkull, 300 m., *Meebold*, 10,783.

According to a note in Herb. Calc. by Mr. Meebold this is also the same as Talbot's 1338 from North Kanara.

579. **Machilus phoenicis**, *Dunn* [Lauraceae-Perseaceae]; affinis *M. microcarpae*, Hemsl., sed floribus multo majoribus.

Arbor mediocris cortice brunneo. *Folia* sparsa, ovato-lanceolata, integra, 10–13 cm. longa, crasse coriacea, glabra, subtus glauca, acuminata, basi cuneata vel rotundata, venis utrinque 8–10, obscure reticulata, petiolis 1·3–1·9 cm. longis. *Flores* paniculas plures 5–8 cm. longas ex gemma terminali magna evolutas formantes; perulae exteriores utrinque glabrae, interiores utrinque sericeae. *Perianthii* ♂ segmenta subaequalia, oblonga, 6–8 mm. longa, apice intus brevissime sericea, viridia, obtusa. *Stamina* 4-locellata, exteriora introrsa, interiora extrorsa. *Flores* ♀ et *fructus* non visi.

China. Eastern Kwantung: near Swatow, bushy gorges on the sides of Phoenix Mountain at 1300 m., *Dunn's native collector*, Hong Kong Herb. 5803.

580. **Phyllanthodendron album**, *Craib et Hutchinson* [Euphorbiaceae-Phyllantheae]; affine *P. rosei*, Craib et Hutchinson, sed foliis lanceolatis, stipulis basi haud productis valde distinctum.

Arbuscula 4·5–7·5 m. alta (*fide Kerr*). *Ramuli* subteretes, glabrescentes, juveniles flexuosi. *Folia* alterna, lanceolata, apice subacuminata, basi inaequalia, rotundata, 8–18 cm. longa, 2–4 cm. lata, chartacea, supra fusco- subtus pallide viridia, utrinque glabra, nervis lateralibus utrinque 10–12 gracilibus arcuatis cum costa supra distinctis subtus prominulis, nervis transversis paucis indistinctis; stipulae e basi lata subulatae, 1·5 mm. longae, glabrae; petioli 5–7 mm. longi. *Flores* axillares, fasciculati, ♂ numerosi, ♀ solitarii vel subsolitarii. ♂ *Pedicelli* 2–3 mm. longi, glabri. *Sepala* 5, elliptica vel obovato-elliptica, obtusa, 2·5 mm. longa, 1·5 mm. lata, 1-nervia, dorso carinata, utrinque glabra. *Disci* glandulae oblongae, truncatae, quam sepalis dimidio breviores. *Stamina* 3; filamenta brevia, connata; antherae inter se liberae, 0·75 mm. longae, connectivo in appendicem lineari-subulatam 0·25 mm. longam producto. ♀ *Pedicelli* quam ♂ breviores. *Sepala* 6, oblongo-elliptica, cetera ut in ♂. *Discus* 6-partitus, segmentis oblongis truncatis quam sepalis paulo brevioribus. *Ovarium* globosum,

leviter trilobatum, glabrum; styli brevissimi, stellato-patuli, apice minute bifidi. *Capsula* late ovoidea, alba (*fide Kerr*), 1·5–2 cm. longa, circiter 1·3 cm. diametro, exocarpio membranaceo reticulato, endocarpio corneo 0·5 mm. lato pallide flavo; semina irregulariter subtriquetra, dorso convexa, in utroque latere excavatione alternatim supra et infra auriformi, 1 cm. longa, dorso 4 mm. lata; testa nitida, minutissime et oblique striolata.

Indo-China. Siam: Chiengmai, on old clearings on Doi Sootep, 720–810 m., *Kerr*, 521, 566.

XL.—NEW ORCHIDS: DECADE 36.

351. **Bulbophyllum trifarium**, *Rolfe*; inter species Madagascarienses parvifloras bracteis et floribus trifariis distincta.

Rhizoma repens, subgracile. *Pseudobulbi* ovoideo-oblongi, 1–5 cm. longi, vaginis membranaceis vestiti, monophylli. *Folia* sessilia, elliptico-oblonga, obtusa, obscure bidentata, coriacea, circiter 4 cm. longa, 1·5 cm. lata. *Scapi* arcuati, 13–15 cm. longi, vaginis membranaceis obtecti; spicae 7–9 cm. longae, multiflorae, rhachi crebre et dense verrucosa. *Bracteae* trifariae, patentes, triangulari-ovatae, breviter acuminatae, 2–3 mm. longae. *Pedicelli* 2 mm. longi. *Sepala* subconniventia, 6–7 mm. longa, posticum ovata-lanceolatum, acuminatum, concavum; lateralia oblique lanceolata, acuminata, subconcava. *Petala* subulato-lanceolata, acuminata, 3 mm. longa. *Labellum* recurvum, oblongum, obtusum, carnosum, lateribus longe barbatis. *Columna* lata, 1 mm. longa; dentibus arcuatis subulatis.

Madagascar.

Flowered in the collection of Sir Trevor Lawrence, Bart., Burford, Dorking, in May, 1897, and on subsequent occasions. The flowers are dull lurid purple, with numerous minute darker dots on the sepals.

352. **Eulophia circinnata**, *Rolfe*: affinis *E. caffrae*, Reichb. f., scapis gracilioribus floribus minoribus et labello latiore differt.

Pseudobulbi ovoideo-oblongi vel fusiformes, apice 2–3-phylli. *Folia* lineari-oblonga, acuta, carnosa, rigida, paullo serrulata, 15–20 cm. longa. *Scapi* laterales, erecti, 6–9 dm. longi, parce ramosi. *Bracteae* subulato-lanceolatae, acuminatae, 6 mm. longae. *Pedicelli* 2·5–3 cm. longi. *Flores* numerosi, laxi. *Sepala* patentia anguste lineari-oblonga, acuta, apice valde revoluta vel circinnata, 2 cm. longa. *Petala* erecta, sepalis paullo breviora et latiora, apice paullo revoluta. *Labellum* late panduratum vel 3-lobum, 2 cm. longum: lobi laterales angusti, venis furcatis instructi; lobus intermedius suborbicularis, undulatus, radiato-venosus; discus carinis 5 crenulatis instructus, mediis 3 longioribus et elevatis; calcar subclavatum, valde curvatum, 6 mm. longum. *Columna* clavata, 6–8 mm. longa; anthera bicornis. *Capsula* ellipsoidea, circiter 4 cm. longa.

S. Africa. Transvaal: at Komati Poort, *J. W. C. Kirk*, 64.

353. **Eulophia longipes**, *Rolfe*; affinis *E. aemulae*, Schlechter, labelli lobis lateralibus duplo latioribus et calcare longiore differt.

Rhizoma validum; nodi incrassati. *Folia* 4–5, fasciculata, linearia, acuta (immatura), basi vaginis latis 4–5 obtecta. *Scapi* circiter 45 cm. longi, basi vaginis 2–3 lanceolatis obtecti; racemi laxi,

15 cm. longi. *Bracteae* ovato-lanceolatae, acutae, venosae, 0·6–1·2 cm. longae. *Pedicelli* circiter 2 cm. longi. *Flores* parvuli. *Sepala* late lanceolata, acuta, 1·2 cm. longa. *Petala* sepalis similia basi paullo latiora. *Labellum* 3-lobum, petalis paullo brevius ; lobi laterales lati, oblongi, subobtusi ; lobus intermedius late ellipticus, obtusus ; discus carinis 7 incrassatis valide papillosis instructus, mediis 3 fere ad basin extensis ; calcar clavatum, gracile, 4 mm. longum. *Columna* clavata, 4 mm. longa, basi in pedem brevem extensa.

S. Africa. Natal, *Buchanan*, 3.

354. **Eulophia purpurascens**, *Rolfe* ; ab *E. barbata*, Spreng., racemis elongatis et laxioribus, labello duplo angustioribus differt.

Rhizoma validum ; nodi incrassati. *Folia* 3–4, fasciculata, stricta, suberecta, anguste elongato-linearia, subacuta, venosa, 15–30 cm. longa, basi vaginis 2–3 lanceolatis obtecta. *Scapi* laterales, erecti, stricti, 0·4–0·8 m. longi, basi vaginis angustis imbricatis obtecti ; racemi elongati, 8–18 cm. longi, multiflori. *Bracteae* lanceolatae, acuminatae, 0·6–1·2 cm. longae, saepissime suberectae. *Pedicelli* graciles, 0·8–1·2 cm. longi. *Flores* mediocres. *Sepala* subconniventia, lanceolata vel anguste oblongo-lanceolata, acuta, 1·2–2 cm. longa, purpureo-brunnea. *Petala* elliptico-lanceolata, subacuta, sepalis subaequalia, purpurea, carnea vel alba et purpureo-maculata. *Labellum* profunde 3-lobum, petalis subaequale ; lobi laterales late oblongi ; lobus intermedius obovatus, apice obtusus vel rotundatus, copiose ramentaceus ; discus basi carinis 3 verrucosis instructus ; calcar clavatum, gracile, rectum vel leviter curvatum, 4–6 mm. longum. *Columna* clavata, 6 mm. longa, apoda.

S. Africa. Natal: Tongaat River, 155 m., *Wood in Mac-Owan & Bolus Herb. Norm. Austr.-Afr.*, 1367, and other localities.

355. **Eulophia gladioloides**, *Rolfe* ; a praecedente labelli lobis lateralibus brevibus multo latioribus differt.

Folia 2–3, fasciculata, stricta, erecta, anguste elongato-linearia, acuta vel attenuata, 30–45 cm. longa, basi vaginis 2–3 lanceolatis imbricatis obtecta. *Scapus* erectus, circiter 60 cm. longus, basi vaginis angustis imbricatis obtectus ; racemus circiter 15 cm. longus, multiflorus. *Bracteae* lanceolatae, acuminatissimae, 1–2 cm. longae. *Pedicelli* graciles, 2 cm. longi. *Flores* lilacini. *Sepala* linear-lanceolata, apiculata vel acuta, 1·2–1·4 cm. longa. *Petala* oblonga vel elliptico-oblonga, subobtusa, sepalis paullo breviora. *Labellum* 3-lobum, petalis subaequale ; lobi laterales breves, apice rotundati ; lobus intermedius suborbicularis, obtusus ; discus medio venis valide cristatis, basi carinis 3 verrucosis instructus ; calcar clavatum, gracile, apice curvatum, 4 mm. longum. *Columna* clavata, 8 mm. longa, apoda.

S. Africa. Natal : at Lidgetton, 915–1250 m., *Wood*, 7922.

356. **Eulophia ovatipetala**, *Rolfe* ; ab *E. barbata*, Spreng., racemis elongatis laxioribus et labelli venis 5–7 cristatis differt.

Folia non vidi. *Scapi* 25–38 cm. longi, vaginis angustis numerosis obtecti ; racemi 8–20 cm. longi, laxi, multiflori. *Bracteae* ovato-lanceolatae vel elliptico-lanceolatae, acuminatae, 0·8–1·5 cm. longae. *Pedicelli* graciles, 1·2 cm. longi. *Flores* patentes, interdum nutantes, mediocres. *Sepala* oblonga vel lanceolato-oblonga, acuta, 1·2–1·4 cm. longa, submembranacea. *Petala* ovata, obtusa, sepalis paullo longiora

et duplo latiora. *Labellum* late ovato-ellipticum, apice obtusum vel rotundatum, petalis paullo brevius ; lobi laterales late rotundati ; lobus intermedius late rotundatus ; discus carinis 5–7 gracilibus cristatis instructus, carinis basi verrucosis ; calcar apice gracile et paullo incurvum, basi latius. *Columna* oblonga vel subclavata, 5–6 mm. longa, basi in pedem brevem extensa.

S. Africa. Port Elizabeth Div. : at Emerald Hill, *Bolus*, 10,674.

357. **Eulophia Engleri**, *Rolfe* ; inter affines labello suborbiculari et dense papilloso facile distinguitur.

Rhizoma validum ; nodi incrassati. *Folia* (immatura). *Scapi* laterales, erecti, circiter 30 cm. longi, basi vaginis lanceolatis obtecti ; racemi laxi, circiter 9-flori. *Bracteae* ovatae vel ovato-lanceolatae, acuminatae, 0·8-1·2 cm. longae. *Pedicelli* graciles, circiter 1·2 cm. longi. *Sepala* oblonga vel elliptico-oblonga, obtusa, 1·2 cm. longa. *Petala* late elliptica, sepalis aequalia. *Labellum* profunde 3-lobum, petalis paullo brevius ; lobi laterales late rotundati ; lobus intermedius late orbicularis ; discus copiose papillosus, basi carinis 5 verrucosis instructus ; calcar clavatum, 4 mm. longum. *Columna* clavata, 5 mm. longa.

S. Africa. Transvaal ; among stones at Klip River Mountains, 1830 m., *Engler*, 2745.

358. **Eulophia transvaalensis**, *Rolfe* ; ab *E. Engleri*, Rolfe, labelli disco parce papilloso differt.

Folia non vidi. *Scapus* erectus, vaginis lanceolatis acutis obtectus ; racemus 10 cm. longus, laxus, circiter 6-florus. *Bracteae* elliptico-ovatae, acutae vel breviter acuminatae, patentes, 6–8 mm. longae. *Pedicelli* graciles, 8 mm. longi. *Sepala* late oblonga, subacuta, circiter 1 cm. longa. *Petala* ovato-oblonga, subobtusa, sepalis paullo latiora. *Labellum* late ovatum, 3-lobum, sepalis subaequale ; lobis lateralibus late rotundatis ; lobus intermedius fere quadratus, apiculatus ; discus carinis 5–7 papillosis instructus, basi carinis 3 verrucosis extensis ; calcar clavatum, strictum, 4 mm. longum. *Columna* late oblonga, 5 mm. longa, basi in pedem brevem extensa.

S. Africa. Transvaal : Vaal Bank ; between the Devil's Kantoor and Pretoria, 1525–1830 m., *Bolus*, 10,676.

359. **Polystachya Talbotii**, *Rolfe* ; *P. Preussii*, Kränzl., similis, sed ab ea labello ecalloso differt.

Herba epiphytica, 8–12 cm. alta. *Pseudobulbi* approximati, basi ovoidei vel ovoideo-oblongi, apice angusti, 1–3 cm. longi, 2–3-phylli. *Folia* sessilia, lineari-oblonga, apice minute tridentata, 4–7 cm. longa, 6–9 mm. lata. *Scapi* pubescentes, 4–8 cm. longi ; racemi 4–6-flori. *Bracteae* deltoideae, acuminatae, 2 mm. longae. *Pedicelli* 4 mm. longi. *Flores* albi, labello rufo-brunneo, columna purpurea. *Sepalum* posticum suborbiculari-ellipticum, concavum, apiculatum, 6 mm. longum ; sepala lateralia elliptico-ovata, apiculata, subfalcata, 6–8 mm. longa. *Petala* elliptico-oblonga, sub-obtusa, 6 mm. longa. *Labellum* unguiculatum, 3-lobum ; limbus 6 mm. longus ; unguis 3 mm. longus ; lobi laterales lati, obtusi ; lobus intermedius obovatus, obtusus, leviter canaliculatus. *Columna* lata, 4 mm. longa. *Mentum* oblongum, obtusum, 6 mm. longum.

Tropical Africa. Upper Guinea : S. Nigeria ; Oban District at Niaji, *Talbot*, 835.

360. **Cynorchis Morlandii**, *Rolfe*; affinis *C. fastigiatae*, Lindl., sed planta monophylla, folio late elliptico-ovato et labelli lobis longioribus distincta.

Herba terrestris, monophylla. *Folia* sessilia, patentia, late elliptico-ovata, apiculata vel breviter et abrupte acuminata, nitida, 6–12 cm. longa, 4–7 cm. lata. *Scapi* erecti, nitidi, 20–30 cm. alti, infra medium vagina angusta obtecti; racemi breves, subcorymbosi, 5–9-flori. *Bracteae* oblongo-lanceolatae, acuminatae, 1–1·8 cm. longae. *Pedicelli* 2·5-3 cm. longi. *Flores* mediocres, lilacini. *Sepalum* posticum erectum, subobtusum, concavum, 5 mm. longum; sepala lateralia subpatentia, late oblonga, subobtusa, paullo concava, 5–6 mm. longa. *Petala* ovato-oblonga, subobtusa, 5 mm. longa, cum sepalum posticum in galeam conniventia. *Labellum* subpatens, 1–1·5 cm. longum, 4-lobum; lobi ovato-oblongi, obtusi, denticulati, 5–7 mm. longi; discus laevis; calcar filiforme, incurvum, circiter 2·5 cm. longum. *Columna* 3 mm. longa.

Tropical Africa. Mozamb. Dist.: Island of Pemba, *C. E. Morland.*

Flowered at Kew in May, 1910, the tubers having been presented by Mr. C. E. Morland, who brought them from the Island of Pemba in the previous autumn. The flowers are lilac-coloured, becoming greenish white on the disc of the lip and at the base of the other segments.

XLI.—INDIGO.

J. H. Holland.

In the *Kew Report* for 1880 some details of Synthetic Indigo were given, and the displacement by it of Natural Indigo was predicted. Eighteen years later (*Kew Bull.* 1898, p. 33), it was pointed out that this prediction, though not quite fulfilled, was approaching realization. At the present time (1910) there is no doubt that the discovery of Artificial Indigo, although a triumph for the chemist, is a misfortune for the planter, and it is now generally conceded that the trade in the Natural Indigo, in all parts of the world, has declined by reason of the advance made by the artificial product during the past 9 or 10 years, although local conditions may to some extent have contributed towards the degeneration of the industry. There should also be taken into consideration the fact that the cultivation has always been somewhat of a precarious nature, a good "stand" apparently being more the exception than the rule. This view is borne out by the remarkable fluctuations in the quantities exported, obtained presumably from the same area. Discovered in 1880 by Professor Baeyer, and made commercially available in 1890 by Professor Heumann, Synthetic Indigo was only beginning in 1901 to find its way into commerce in appreciable quantities. About that time the German Naval Administration refused "all woollen cloth dyed with Synthetic or Artificial Indigo," and required "all blue materials to be dyed with Natural Indigo from India," at least until some experiments they were then conducting were completed (Journ. Soc. Arts, xlix. 1901, p. 395). Interest in the artificial product was not wanting, but the attitude of this

important branch of the German Administration towards it is sufficient testimony of the stage at which it then stood.

In 1902 some samples of Artificial Indigo were exhibited at the Royal Society by the Badische Anilin und Soda Fabrik, of Ludwigshafen on the Rhine, and the manufacture was described as follows :—

"The initial material is napthalene ; this is converted by oxidation with sulphuric acid into phtalic-anhydride, and the latter is next transformed into anthranilic acid, which, in conjunction with chloracetic acid, yields phenylglycin-orthocarboxylic acid. The latter body is treated with a caustic alkali at a high temperature, and yields indoxyl or indoxylic acid.

"It is interesting to note that this product indoxyl also results in the treatment of the indigo plant as practised in the tropics.

"The last stage in the process, whether starting from napthalene or from the indigo plant, is identical, viz., the oxidation of indoxyl into indigo" (Descr. Cat. Roy. Soc. Conversaz. May 14th, 1902, p. 4).

Efforts are now being made by the Government of India to improve the situation for the planter. The Agricultural Department is enquiring into the possibilities of improvement in cultivation on scientific principles, especially in the direction of producing a plant with a greater indican content in the leaf than is usually found in that of *Indigofera tinctoria*, and in general with a view to reducing the cost of production as much as possible.

This has, to a large extent, already been met by the cultivation of "Natal" or "Java" Indigo (*Indigofera arrecta*, Hochst.), which is said to yield about twice the amount of green leaf, with a proportionate increase of the dye. The uncertainty of germination, which is characteristic of this species, due to the very hard seed coat or testa, has been almost entirely overcome by scratching the seed before sowing in a specially constructed machine, and the same or possibly a better result is obtained by treatment with sulphuric acid (Agric. Journ. India, i. 1906, p. 262).

The chemistry of Indigo, mainly devoted to analysis of the commercial product and the leaf in estimation of the indican content, is being studied at the University of Leeds, and in the field (Report to the Government of India: an account of the Research Work on Indigo in the University of Leeds, 1905–7, under the direction of Professor Perkin).

Dyeing tests with Natural and Synthetic Indigo carried out at Sirseah, India, so far indicate that the natural dye goes further than the synthetic dye (Burkill & Annett, Industr. and Agric. Chemistry, p. 13).

Cloth dyed entirely with Synthetic Indigo fades in about two months, but a mixture of the artificial and natural product is more durable and also brighter in colour than the Natural Indigo (Journ. Soc. Arts, lii. 1904, p. 539).

Experiments on manufacture at Sirseah, mainly directed to the question of loading the vats, show that "good quality Java plant should never be loaded more heavily than 80 maunds [6,576 lbs.] per 1,000 cubic feet, and the loading should be increased as the quality of the plant falls off (Burkill and Annett, l.c.).

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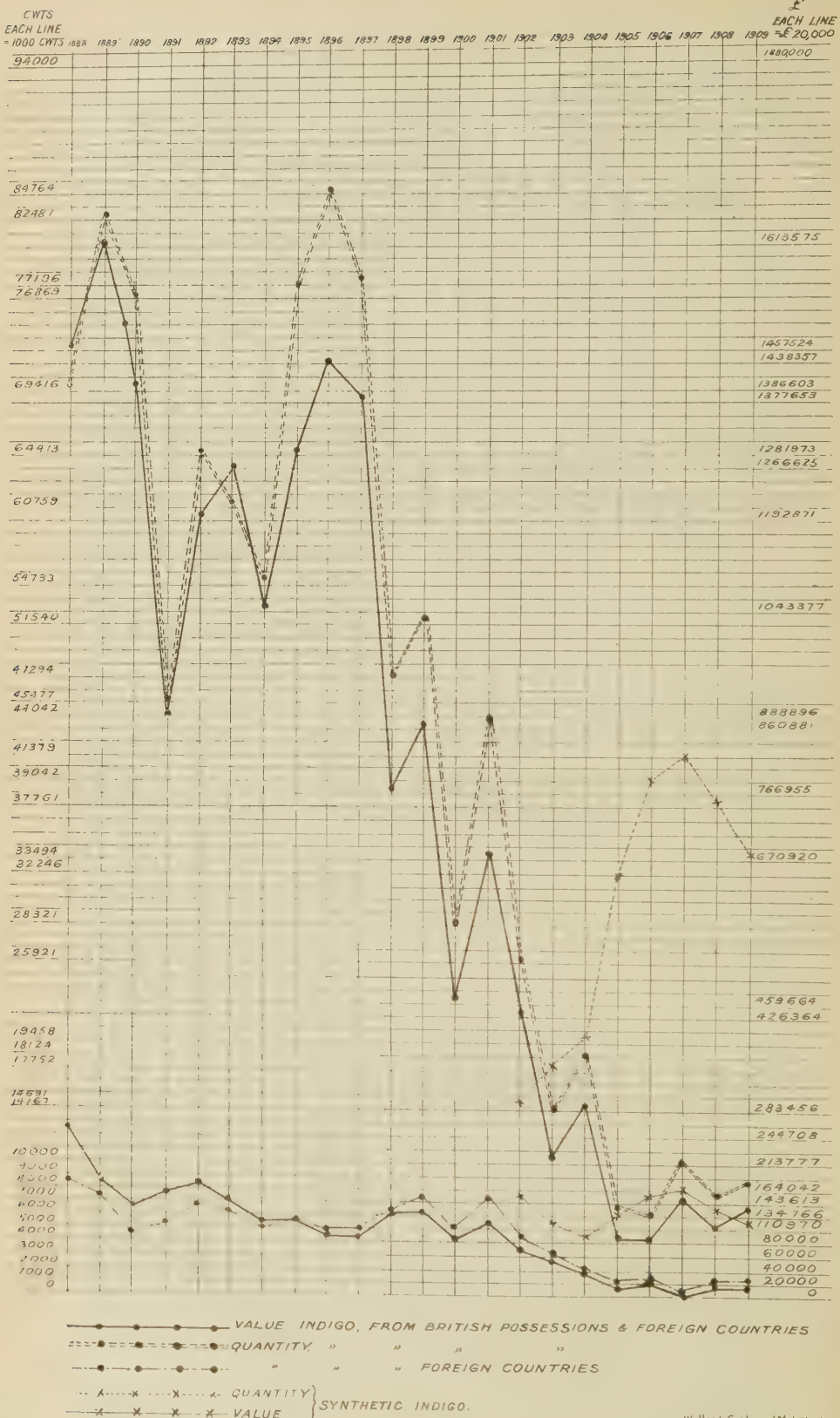

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It is hoped, therefore, that by this working together of the scientific and the practical some method may be evolved, and some definite advance made that will enable the natural product to hold its own.

There appears to be no doubt as to the superiority of the natural over the artificial product for dyeing purposes, and this is not where the fault lies; but it does seem very problematical as to whether good quality indigo can ever be produced under cultivation at so cheap a rate as that at which the synthetic substance is now manufactured. It has been stated that the two products are more effective when mixed in equal proportions, and if this be always true it is possible that it may contribute more than anything else to the support, and perhaps to the expansion, of the cultural industry.

The value for "fine Bengal" Indigo between the years 1812 to 1833 varied from 5*s.* 6*d.* to 15*s.* per lb., and the average quantities exported from Bengal during the same period varied from about 7,000,000 to 9,000,000 lbs. annually (Dict. Commerce and Navigation, McCulloch, 1834, p. 683). It will be noted that in 1888 (*see* the accompanying chart), the average exports from British India (Bengal the chief source), are approximately the same, and we may perhaps correctly assume, allowing for fluctuations stated, that they have been about the same during the intervening period of 50 years or so, although the value in 1888 averaged 3*s.* 9*d.* per lb. and in 1908 about 2*s.* 6*d.* to 2*s.* 9*d.* per lb.

Superior sorts of Java Indigo were in 1901 quoted at from 4*s.* 9*d.* to 5*s.* 1*d.* per lb. (Cons. Rep. Ann. No. 2761, 1902, p. 7).

The price of Synthetic Indigo in 1897 was 30 frs. per kilo., or 10*s.* 10*d.* per lb. (Cons. Rep. Ann. No. 2668, 1901, p. 24); in 1900, 6*s.* 4*d.* per lb. delivered free at consumer's works, the cost to the manufacturer being only 3*s.* 7*d.* per lb. (l.c.); in 1902 the value comes out at 1*s.* 9*d.* per lb., and in 1908 at 7½*d.* per lb. (c.i.f. to place of landing, *see* chart).

According to Mr. Consul-General Gurney, Artificial Indigo was first launched on the French market under the name of "Indigo pure, B.A.S.F." (Badische Anilin und Soda Fabrik), and the pure product is still sold under the same name; but for facility of manipulation it is sold in the form of a paste containing 20 per cent. of indigotine, convenient for transport and use (Cons. Rep. Ann. No. 2668, 1901, p. 22).

In the earlier stages of its commercial development in this country the imports were returned amongst "other coal tar dyes," in 1902 and 1903 as "Indigotin," and afterwards as "Synthetic Indigo."

The accompanying chart gives an approximate idea of the present position of the dual industry. It represents only the imports of the United Kingdom. The figures are taken from "The Annual Statement of the Trade of the United Kingdom with Foreign Countries and British Possessions," compiled at the Custom House. The values include prime cost, plus insurance and freight to place of landing.

The exact figures up to 10,000 cwts. and £100,000 are, for want of space, omitted.

The graph is confined advisedly to the returns given in the above mentioned statement.

The foreign countries include Germany, Netherlands, Belgium, France, Austrian Territories, U.S. America, San Salvador, Colombia, Philippines, and Ecuador, involving probably the produce of three species of *Indigofera*, viz., *Anil*, *arrecta*, and *tinctoria*.

Egypt as a source of Indigo is mentioned once in the returns covered by the chart—17 cwts., value £122 in 1897, and also the French Possessions in India—85 cwts., value £1090.

The British Possessions include Bengal (the chief source), Bombay and Sind, Madras, Straits Settlements, Ceylon and British Honduras, the produce of *Indigofera tinctoria*, and in recent years possibly also of *Indigofera arrecta*. Returns from the Niger Coast Protectorate appear once only—13 cwts., value £19 in 1896, which may have been derived from *Indigofera tinctoria*, but it is possible that it may also have been in part the produce of *Lonchocarpus cyanescens*.

The countries from which Synthetic Indigo comes are Germany (the chief source of supply to this country), France and the Netherlands.

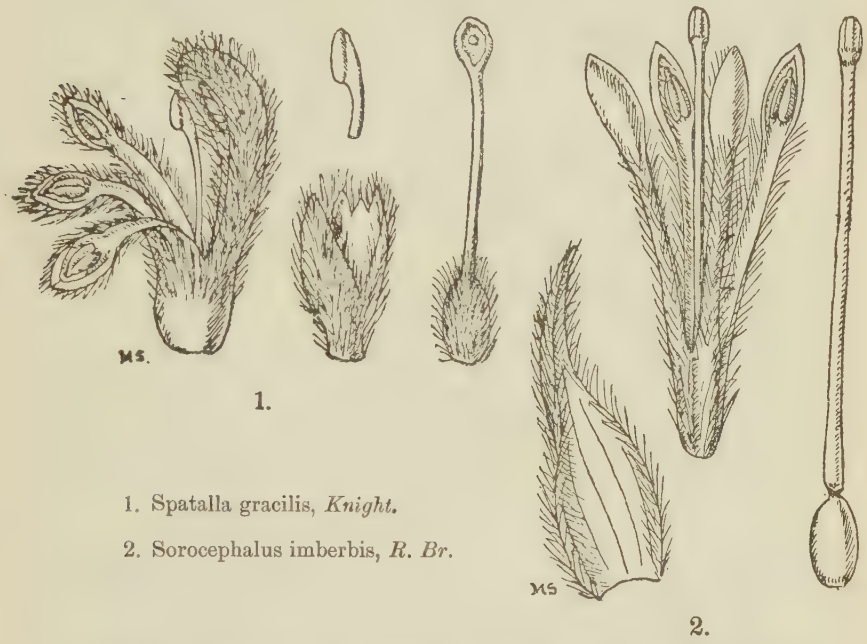
As showing the extent of the trade in Synthetic Indigo between Germany and other parts of the world, in 1905 the exports of Indigo (almost exclusively Synthetic or Artificial) from Germany were (in metric tons) as follows :—To Belgium, 235 ; France, 135 ; United Kingdom, 1561 ; Italy, 467 ; Netherlands, 640 ; Austria-Hungary, 1141 ; Russia, 316 ; Sweden, 81 ; Switzerland, 82 ; Spain, 63 ; Turkey, 25 ; Egypt, 281 ; India, 155 ; China, 2597 ; Japan, 639 ; and to the United States of America, 2536 (Dip. and Cons. Rep. No. 3544, Ann. 1906, p. 66, which see for Exports for the years 1902, 1903, and 1904).

XLII.—SPATALLOPSIS, A NEW GENUS OF PROTEACEAE.

E. P. Phillips.

Knight in his description of the genus *Spatalla*, in his Proteeae (pp. 73–78) included three plants *S. thyrsiflora*, Knight, *S. ericaefolia*, Knight, and *S. caudaeflora*, Knight, which differ from his other species in the genus in having conical stigmas (described as clavate). R. Brown (Trans. Linn. Soc. x. 150) also described three plants under the genus *Spatalla*, namely, *S. propinqua*, R.Br., *S. caudata*, R.Br., and *S. Thunbergii*, R.Br. (= *S. caudaeflora*, Knight), regarding at the same time *Spatalla thyrsiflora*, Knight, as a *Sorocephalus*, and describing it as *S. setaceus*, R.Br. l.c. 140. Later authors, as Roemer and Schultes in their Systema Vegetabilium, iii., 389–396, and Meisner (in DC. Prodr. xiv., pp. 303–310), whose monograph is the last important systematic work on the *Proteaceae*, followed Robert Brown, ignoring Knight. When working through the genus *Spatalla* I found that all the above-mentioned species not only differed from the true Spatallas in having a conical and not a flat obovate stigma but also that the calyx was regular, whereas in *Spatalla* the inner

calyx-segment is always larger, more densely villous and longer-bearded than the other three. On account of their having a regular calyx and a conical stigma I placed these species in *Sorocephalus*, but found when preparing a key that these plants separated out from the rest of the genus. On re-examining all the specimens and preparing in a tabulated form the differences and resemblances between these doubtful specimens and species of *Spatalla* and *Sorocephalus*, I came to the conclusion that those hitherto considered as belonging to *Spatalla* and the one regarded as a *Sorocephalus* belonged to neither genus, and to accommodate them I have founded the genus *Spatallopsis*.



1.

2.

1. Spatalla gracilis, *Knight*.

2. Sorocephalus imberbis, *R. Br.*

The genus *Spatallopsis* differs from *Spatalla*, Salisb., principally in having a regular calyx and a conical stigma. From *Sorocephalus* it differs in having a quadrangular calyx tube $\frac{1}{3}$–$\frac{1}{2}$ the length of the whole calyx, in the style being inserted obliquely on the ovary and not constricted at the base, and in having the inflorescence in the form of a cylindric spike or raceme and not globose. In vegetative characters there is no difference, all three genera having simple, entire, usually filiform leaves. The cylindric inflorescence, however, gives the species of *Spatallopsis* more the appearance of a *Spatalla* than of a *Sorocephalus*.

Spatallopsis, *Phillips*, gen. nov. [Proteaceae-Proteeae] ; *Spatallae*, Salisb. et *Sorocephalo*, R. Br. proxima sed ab illa calycis symmetria et stigmate conico vel clavato, et ab hac calycis tubo quadrangulo, floribus in spicam vel racemum cylindricum confertis et stylo haud basi constricto differt.

Flores hermaphroditi. *Capitula* parva 2–4-flora, in spicam vel racemum terminalem solitarium vel 2–9-natum disposita, sessilem vel subsessilem. *Bracteae* ovatae vel lanceolatae. *Involucri squamae*

basi connatae, bilabiatae ; labium inferius fere ad basin tripartitum ; segmenta ciliata, pilosa vel glabra. *Calyx*, 4-lobus, ad $\frac{1}{2}$–$\frac{1}{3}$ tubulosus ; tubus quadrangulus, pubescens vel glaber ; lobi aequales, spathulato-lineares, barbigeri et villosi. *Stamina* 4 ; antherae subsessiles, ellipticae, apice glandibus minutis instructae. *Ovarium* obovatum vel obovato-oblongum, hirsutum vel villosum, aliquando subpedicellatum. *Stylus* filiformis, raro attenuatus, supra rectus vel curvus, saepe oblique ovario insidens, glaber. *Stigma* conicum vel clavatum, rectum vel curvum. *Squamae* hypogynae 4, lineares. *Fructus* obovatus vel globosus, fere subpedicellatus, hirsutus vel glaber.

Frutex parvus. *Folia* filiformia vel teretia, acuta, mucronata, supra unisulcata, pilosa vel glabra.

Species 5, Capenses.

Clavis specierum.

Folia 4–9 mm. longa.
  Folia mucrone obtuso.
    Folia pilosa ; stigma conicum ... 1. *S. ericaefolia.*
    Folia glabra ; stigma clavatum ... 2. *S. confusa.*
  Folia mucrone acuto ... ... 3. *S. caudaeflora*
Folia 1–2 cm. longa.
  Folia 1–1·5 cm. longa ; bracteae glabrae 4. *S. caudata.*
  Folia 1·5–2 cm. longa ; bracteae pilosae 5. *S. propinqua.*

1. **S. ericaefolia**, *Phillips*. *Rami* glabri, demum pubescentes. *Folia* 4–6 mm. longa, recta, apice paullo incurva, linearia, apice obtusa, minute punctata, infra convexa, supra unisulcata, pilosa, demum glabra. *Capitula* 3–4-flora in spicis terminalibus solitariis vel adnatis 1·2–2·5 cm. longis. *Bracteae* 6 mm. longae, ovato-lanceolatae, acuminatae, apice acutae, ciliatae, pilosae. *Involucrum* 4 mm. longum, bilabiatum, pilosum ; labium inferum tripartitum ; segmenta lateralia 3 mm. longa, ovata, acuminata, apice acuta, ciliata ; segmentum medium 3 mm. longum, lanceolatum, acuminatum, apice acutum, ciliatum. *Tubus calycis* 3 mm. longus, superne pubescens, basi glaber; laminae 4 mm. longae, spathulato-lineares, villosae, apice dilatato 0·7 mm. longo elliptico obtuso barbigero villoso. *Stamina* 7 mm. longa. *Stylus* 5·5 mm. longus, filiformis, oblique ovario insidens. *Stigma* 0·33 mm. longum, conicum. *Ovarium* 2 mm. longum, obovatum, hirsutum. *Squamae* hypogynae 1·5 mm. longae, lineares, acuminatae, apice acutae. *Fructus* 3 mm. longus, obovatus, pilosus.

Spatalla ericaefolia, Knight, Prot. 75.

South Africa. Verhoode Valley, *Niven* ; without precise locality, *Masson* ; no collector in *Herb. Forsyth.*

2. S. confusa, *Phillips.* *Rami* pubescentes vel glabri. *Folia* 1 cm. longa, circiter 1 mm. lata, apice subobtusa, minute mucronata, glabra. *Capitula* 2–4 flora, in racemis subsessilibus terminalibus solitariis vel 2–3-natis 1·5–2 cm. longis. *Bracteae* 4 mm. longae, lanceolatae, apice acutae, ciliatae, glabrae; labium inferum tripartitum; segmenta inaequalia. *Tubus calycis* 3·5 mm. longus, glaber; laminae 5 mm. longae, spathulato-lineares, ciliatae, sparse pilosae vel glabrae, apice dilatato elliptico obtuso barbigero villoso. *Stamina* 1 mm. longa. *Stylus* 6 mm. longus, filiformis, supra curvus, oblique ovario insidens. *Stigma* 5 mm. longum, clavatum. *Ovarium* 2 mm. longum, villosum. *Squamae* hypogynae 1 mm. longae, lineares.

South Africa. Clanwilliam Div.: Ezelbank, *Drège*; *Schlechter*, 8838; Ceres Div.: Gydouwberg, *Schlechter*, 10225; Schoongezigt, *Schlechter*, 10180. Prince Albert Div.: Zwartberg Pass, *Bolus*, 11627.

3. S. caudaeflora, *Phillips.* *Rami* pilosi. *Folia* 0·6–1 cm. longa, linearia, apice acuta, mucronata, minute sed distincte punctata, pilosa. *Capitula* 3–4-flora in spicis cylindricis terminalibus solitariis 2·5–4 cm. longis. *Bracteae* 4 mm. longae, lanceolatae, apice subobtusae, ciliatae, pilosae. *Pedunculus* 0·75 mm. longus. *Involucrum* bilabiatum; labium inferum tripartitum; segmenta lanceolata, apice subacuta, longe denseque ciliata, pilosa. *Tubus calycis* 2 mm. longus, superne pubescens, inferne glaber; laminae 4 mm. longae, spathulato-lineares, hirsutae, apice dilatato 1 mm. longo ovato subobtuso barbigero dense villoso. *Stamina* 0·75 mm. longa. *Stylus* 5 mm. longus, filiformis, supra curvus, oblique in ovario insertus. *Stigma* 5 mm. longum, globoso-conicum. *Ovarium* 1 mm. longum, subpedicellatum, hirsutum. *Squamae* hypogynae 1 mm. longae, lineares. *Fructus* 3 mm. longus, pedicellatus, hirsutus.

Spatalla caudaeflora, Knight, Prot. 75; *S. Thunbergii*, R.Br. in Trans. Linn. Soc. x. 150; Roem. and Schultes, Syst. Veg. iii. 396; Meisner in DC. Prodr. xiv. 310 (excl. var.).

South Africa. Caledon Div.: Zwartberg, *Niven.*

4. **S. caudata**, *Phillips*. *Rami* glabri vel sparse pilosi. *Folia* 1–1·5 cm. longa, linearia, apice acuta, mucronata, aliquid pilosa vel glabra. *Capitula* 3–4-flora, in racemis sessilibus terminalibus cylindricis solitariis vel 4-natis 2·5–6 cm. longis. *Bracteae* 5 mm. longae, ovatae, subacuminatae, apice acutae, minute ciliatae, glabrae. *Pedunculus* 1 mm. longus, pubescens. *Involucrum* bilabiatum; labium inferum tripartitum; segmenta lateralia ovata, apice acuta, minute ciliata, pubescentia vel glabra; segmentum medium lanceolatum. *Tubus calycis* 2 mm. longus, superne pubescens, inferne glaber; laminae 4 mm. longae, spathulato-lineares, villosae, apice dilatato 1 mm. longo ovato acuto barbigero dense villoso. *Stylus* 5 mm. longus, filiformis, supra curvus, vix oblique ovario insidens, persistens. *Stigma* 0·5 mm. longum, conicum, obliqum. *Ovarium* obovato-oblongum, villosum. *Fructus* subpedicellatus, 4 mm. longus, globosus, superne pilosus.

Spatalla caudata, R.Br. in Trans. Linn. Soc. x. 150; Roem. and Schultes, Syst. Veg. iii. 396; Meisner in DC. Prodr. xiv. 310; *Protea caudata*, Thunb. Diss. Prot. 26 t. 2.

South Africa. Caledon Div.: Palmiet River, *Masson*; without precise locality in *Herb. Forsyth* (no collector).

5. **S. propinqua**, *Phillips*. *Rami* sparse pilosi. *Folia* 1·7–2 cm. longa, filiformia, apice acuta, mucronata, pilosa. *Capitula* 3–4-flora, in racemis terminalibus pedunculatis circiter 9-natis 5–8 cm. longis. *Bracteae* 5 mm. longae, lanceolatae, apice subacutae, ciliatae, pilosae. *Pedunculus* 1 mm. longus, hirsutus. *Involucrum* 4 mm. longum, bilabiatum, pilosum; labium inferum tripartitum; segmenta lateralia, ovata, apice acuta, ciliata; segmentum medium lineare, ciliatum. *Tubus calycis* 2·5 mm. longus, glaber; laminae 3·5 mm. longae, spathulato-lineares, villosae, apice dilatato 1 mm. longo ovato obtuso barbigero dense villoso. *Stylus* 5 mm. longus, cylindricus, oblique ovario insidens. *Stigma* 0·5 mm. longum, conicum, obliqum. *Ovarium* 1·5 mm. longum, oblongum, villosum. *Fructus* subpedicellatus, 2 mm. longus, obovatus, hirsutus.

Spatalla propinqua, R.Br. in Trans. Linn. Soc. x. 150; Meisner in DC. Prodr. xiv. 309; *Protea australis*, Poir. Suppl. iv. 579.

South Africa. Without precise locality, *Auge*.

XLIII.—INDIAN SPECIES OF IMPATIENS.

GENERIS IMPATIENS SPECIES INDICAE NOVAE ET MINUS RITE COGNITAE A CL. A. MEEBOLD DETECTAE.

J. D. Hooker.

I. Species Himalayae boreali-occidentalis incolae.

1. I. Meeboldii, *Hk. f.*, sp. nov. : *I. Flemingii*, Hk. f. affinis, differt foliis oppositis et floribus minoribus subumbellulatis.

Herba gracilis, erecta, micrantha, caule 2–3 dm. longo simplici stricto inferne longe nudo superne paucifoliato. *Folia* 3–5 cm. longa, opposita vel superiora fasciculata, suprema sessilia, inferiora petiolata, membranacea, ovata vel ovato-lanceolata, acuminata, minute spinuloso-serrulata, utrinque 6–10-nervia, inferiora in petiolum gracilem 2–3 cm. longum angustata ; glandulae infrapetiolares minutae, globosae. *Pedunculi* ex axillis supremis, erecti, foliis subaequilongi, imo apice 3–6-flori ; pedicelli breves, capillares, umbellati vel breviter racemosi ; bracteae minutae, ovato-lanceolatae, subverticillatae, persistentes. *Flores* 6–8 mm. expansi, albi, apicibus sepalorum et labelli purpureis ; raphides 0. *Sepala* 2, ovata, obtusa, 2 mm. longa. *Vexillum* orbiculare, 5 mm. diametro, conchiforme, muticum, dorso rotundatum. *Alae* sessiles, angustae, 1–1·2 cm. longae ; lobus basalis parvus, oblongus, distalis duplo vel triplo longior, infra medium semilunaris, dein linearis, apice rotundatus ; auricula dorsalis obscura. *Labelli* limbus scaphiformis, ad 6 mm. longus, ascendens, cuspidatus ; calcar limbo aequilongum vel paullo longius, rectum. *Filamenta* anguste linearia ; antherae minutae, didymae. *Ovarium* ellipsoideum. *Capsulae* clavatae vel oblongae, acutae, 1·2–1·3 cm. longae, oligospermae. *Semina* oblongo-obovoidea, 3–5 mm. longa, laevia, castanea.

Kashmir. Gurais, 2440 m., Aug. 1905, *A. Meebold*, 2467.

A very distinct little species, allied to the opposite-leaved variety of *I. brachycentra*, Kar. et Kir. in the serrulate leaves, but differing in these being opposite, in the minute sepals, the long spur of the lip and the capsule.

2. I. pahalgamensis, *Hk. f.*, sp. nov. ; *I. racemosae*, DC. affinis, differt caule robusto, foliis crassioribus, floribus roseis, capsula apice rotundata seminibusque tuberculatis.

Herba erecta, 3–4 dm. alta, glaberrima, minutiflora, caule subsimplici robusto inferne longe nudo. *Folia* 4–5 cm. longa, alterna, conferta, petiolata, crassiuscula, ovata, acuta, grosse crenata setulis nunc interjectis, basi acuta vel rotundata, petiolo 1–2 cm. longo, nervis utrinque 6–8 ; glandulae infrapetiolares pulvinatae vel 0. *Pedunculi* erecti, foliis subaequilongi, 3–6-flori ; pedicelli florentes breves, fructiferi 1–2 cm. longi ; bracteae 2–4 mm. longae, lineares vel lineari-lanceolatae. *Flores* 3–4 mm. expansi, rosei ; raphides 0. *Sepala* 2, ovata vel ovato-rotundata, obtuse cuspidata, 4 mm. longa, inaequilatera. *Vexillum* orbiculare, cucullatum, 4 mm. latum, dorso carinatum, carina apice rostellata. *Alae* ? *Labelli* limbus late infundibularis vel cymbiformis, in calcar limbo brevius incurvum attenuatus, ore horizontali acuto vel cuspidato. *Filamenta* gracilia ;

antherae minimae, didymae, fere liberae. *Ovarium* ellipsoideum, acutum. *Capsulae* anguste ellipsoideae vel lineari-oblongae, 1·5–2 cm. longae, rectae vel incurvae, apice rotundatae, deflexae, oligospermae. *Semina* obovoideo-oblonga, 3–5·5 mm. longa, tuberculata, pallida.

Kashmir. Pahalgam, 2440 m., June, 1905, *A. Meebold*, 2464.

The specimens are few and not in very good condition. The wings in bud are short, broad and sessile. The spur of the lip is sometimes subinflated. The capsules are sausage-shaped.

II. Species Peninsulae occidentalis incolae.

* *Herbae; folia opposita; inflorescentia simpliciter pedicellata.*

\+ Sepala linearia, labelli limbum aequantia; semina laevia, nitida.

3. **I. chinensis**, *Linn.*, forma caule gracili, foliis 3–5 cm. longis lineari- vel obovato-oblongis basi angustatis fere integerrimis subtus saepe asperulis, floribus 1·5–2 cm. expansis roseo-purpureis, calcare 3–5 cm. longo, capsulis 1 cm. longis oligospermis.

Mysore. Aligalhatti, 1065 m., Feb., 1908, *A. Meebold*, 8258, et Chickenatti, 915 m., Nov. 1908, 10,703.

4. **I. rupicola**, *Hk. f.*, sp. nov.; *I. chinensi* affinis, foliis integerrimis, floribus capsulisque multo minoribus et labelli calcare minuto distincta.

Herba 3–4 dm. alta, erecta, fere glaberrima, parviflora, caule gracili simplici vel parce ramoso, internodiis elongatis. *Folia* opposita, sessilia vel brevissime petiolata, 3–8 cm. longa, submembranacea, oblonga, obovato-oblonga vel linearia, acuta, integerrima vel subserrata, basi rotundata, cordata vel acuta, nervis obscuris; glandulae infrapetiolares subulatae vel 0. *Inflorescentia* simpliciter pedicellata; pedicelli solitarii vel bini, gracillimi, 3–4 cm. longi, glabri vel puberuli, patuli vel fructiferi deflexi. *Flores* 1·5–2 cm. expansi, rosei vel roseo-purpurei; raphides 0. *Sepala* 2, linearia, acuminata, 7–10 mm. longa, 3-nervia, glabra, raro pilosa. *Vexillum* orbiculare, cucullatum, 8–10 mm. diametro, costa dorso carinata, carina mucronata ima basi gibba. *Alae* late stipitatae, 1·2–1·5 cm. longae; lobus basalis parvus, trigonus, erectus, distalis multo major, stipitatus, orbicularis vel obovatus; auricula dorsalis rotundata, porrecta vel decurva. *Labelli* limbus profunde cymbiformis, ore ascendente obtuso apiculato, calcare minimo incurvo. *Filamenta* subulata; antherae connatae, decurvae. *Ovarium* rectum, apice acutum, incurvum. *Capsulae* ellipsoideae, breviter stipitatae, longe acute rostratae, 12–15 cm. longae, polyspermae. *Semina* orbicularia, compressa, 2–2·5 mm. diametro, laevia, atra vel castanea, nitida.

Bombay. Belgaum: North Hills, *Dr. Ritchie*, 120; *I. H. Burkill*, Nov. 1902, 16,972; N. Kanara, Sept., 1891, *Talbot*, 2514; Castle Rock, 610 m., Oct. 1908, *A. Meebold*, 10,719; Mysore, Shimoga, 610–915 m., *A. Meebold*, 14,720; Poona distr., Kandala, 610 m., Sept. 1907, *A. Meebold*, 8813.

I. rupicola may prove to be a small flowered and fruited, almost spurless state of *I. chinensis*, which it seems to represent in the Western Ghats from the latitude of Goa to that of Poona.

5. I. Kleinii, *Wight & Arn.*

Mysore. Western Ghats: Shukravarsanti, 1065 m., Nov. 1908, *A. Meebold*, 10,700; Kulhutty: mont. Bababuden, 1830 m., *A. Meebold*, 10,705; Talguppa, 610 m., Oct. 1908, *A. Meebold*, 10,711; Gersoppa Falls, 610 m., Oct. 1908, *A. Meebold*, 10,713.

Kanara bor. Castle Rock, 610 m., Oct. 1908, *A. Meebold*, 10,714–10,717.

Konkan bor. Poona Distr.: Lonauli, 610 m., Sept. 1907, *A. Meebold*, 8910.

The eight numbered sheets of this species collected by Mr. Meebold present great variety of habit and foliage, but singular correspondence in floral organs and fruit. In small specimens the stems are 1·5–2 dm. long or high, erect or diffusely branched, in larger they exceed 3 dm. The leaves are sessile or very shortly petioled, quite glabrous, 2–8 cm. long, orbicular, ovate, elliptic, oblong or linear, nearly quite entire, acute or obtuse, base rounded or contracted, very rarely cordate, the upper ones biglandular at the base. The pedicels are 1–2 cm. long, always glabrous, solitary or binate, lengthening in fruit but rarely equalling the leaves. The minute flowers are white or pale pink or violet-purple, rarely pilose. The linear, acute or subacute sepals vary in breadth and are 1–3-nerved. The small, hooded, apiculate, green standard is dorsally keeled. The obovate or rounded distal lobe of the wings is stipitate for about its own length with no trace of a basal lobe or dorsal auricle on the stipes. The slender spur of the lip is usually about twice the length of the limb, and usually strongly incurved. The filaments are very slender, nearly equal in length, and the minute anthers nearly erect. The ripe capsules are 1–1·5 cm. long, linear or turgidly ovoid, straight, shortly stipitate, acutely beaked, few seeded; seeds orbicular, compressed, 2·5 mm. diam., black, shining.

I. Kleinii is the commonest species in the Western Ghats from Poona to Travancore; it has not been recorded from any central or eastern district of the Peninsula.

6. I. pusilla, *Heyne ex Wall.* Cat. n. 4745; Hk. f. & T. in Journ. Linn. Soc. ser. iv. (1860), 122.

I. inconspicua, Benth. in Wall. Cat. n. 4741; Wight et Arn. Prodr., 139; Wight Ic. t. 970; Dalz. & Gibs. Bomb. Flora, 43; Hk. f. Fl. Brit. Ind. i. 447, et in Rec. Bot. Surv. Ind. iv. (1906) 41, 46; Woodr. in Journ. Bomb. Nat. Hist. Soc., xi. ii. (1897) 266; T. Cooke, Bomb. Flor. i. 171; Herb. Wight, Kew distrib. n. 313.

I. inconspicua, var. 2 *pusilla*, var. 3 *filiformis*, var. 4 *ramosissima*, Hk. f. Fl. Brit. Ind. i. 448; T. Cooke, Bomb. Flor. i. 172.

I. oppositifolia, Herb. Wight ex Wall. Cat. no. 4743B, non Linn.

I. filiformis, Wight & Arn., l.c. 140; Herb. Wight, Kew distrib. n. 315.

I. ramosissima, Dalz. in Hook. Kew Journ. Bot. iii (1851), 230.

I. rosmarinifolia? Retz, Wight Ic. t. 750.

I. Perrottetii, Turz. in Bull. Soc. Nat. Mosc. xxxvi. (1863) 594; Hk. f. in Hook. Ic. Pl. t. 2909.

I. tenella, Herb. Wight, Kew distrib. n. 314, *non Heyne*.

Western Ghats, from the Konkan to Travancore, 915–2440 m.

Var. **nematostachys**, *Hk. f.*; caule 2 dm. alto subsimplici vel ramoso ramisque filiformibus rigidis, internodiis elongatis, foliis coriaceis, vexilli costa dorso gracili basi vix gibbosa.

Herba gracillima, glaberrima, minimiflora, 2 dm. alta, caule erecto stricto vel flexuoso laxe ramoso ramisque fere filiformibus rigidis roseis purpureisve, internodiis elongatis. *Folia* 2–3 cm. longa, opposita, subsessilia, coriacea, superiora linearia vel linearioblonga, acuta, integerrima vel minute spinuloso-serrulata, basi rotundata, eglandulosa, inferiora latiora, basi angustata, nervis obscuris; glandulae infrapetiolares 0. *Pedicelli* breves, solitarii, uno latere puberuli, fructiferi foliis breviores, deflexi. *Flores* ad 5 mm. expansi, albi, intus basi punctis lineis 2 purpureis notati. *Sepala* 2, linearia, acuminata, 4 mm. longa, uninervia. *Vexillum* orbiculare, fornicatum, 3 mm. diametro, costa dorso carinata, carina apice cuspidata. *Alae* sessiles, 4·5 mm. longae; lobus basalis oblongo-rotundatus, distalis triplo major, dolabriformis, apice rotundatus; auricula dorsalis obscura. *Labellum* cymbiforme, 4 mm. longum, acuminatum, subtus rotundatum, ecalcaratum. *Filamenta* angusta; antherae minimae. *Ovarium* ovoideum, rostratum. *Capsulae* ellipsoideae, 6 mm. longae, medio turgidae, utrinque attenuatae, rectae, oligospermae. *Semina* late obovoidea vel rotundata, 1·5 mm. longa, laevia, nitida, atra, strophiolo basi albo.

Mysore occident. Kulhutty: mont. Bababuden, 1830 m., Nov. 1908, *A. Meebold*, 10,707.

In its erect, rigid, filiform stems and coriaceous, remote pairs of leaves, var. *nematostachys* differs greatly from ordinary forms of *I. pusilla*, as it does further in wanting the gibbus at the base of the vexillum. Mr. Meebold notes that the flowers are white with two purple streaks or lines of spots in the throat.

I. pusilla has been a "non rite cognita" species, of which the only known specimens were imperfect ones in the Wallichian Herbarium, collected in the Bababuden Hills by Heyne. Wight & Arnott in the Prodromus Florae Penins. Ind. Or., cite it as a synonym of *I. inconspicua*, Benth., under which they note "These two synonyms appear at first sight to belong to very distinct species; but a more careful examination suggests that *I. inconspicua* is a luxuriant, and *I. pusilla* a starved form of the same plant: at least we can perceive no important mark by which to separate them." The fact is that *I. pusilla* is as variable and common a species in the Western Ghats as *I. oppositifolia* and *I. Kleinii*, from which it may be distinguished by the cymbiform spurless or almost spurless lip. Its complicated synonymy being now I hope satisfactorily cleared up, I am disposed to adopt the name given to it by its discoverers.

I have seen no specimens from the central or eastern districts of the Peninsula, but a specimen in Herb. Hort. Bogor. received from the Calcutta Herbarium and ticketed "Assam, Col. Jenkins," suggests the possibility of its occurrence in the Eastern Ghats or West of the Peninsula.

7. I. **Nataliae**, *Hk. f.*, sp. nov.; *I. Lawii* affinis, floribus multo minoribus albis, vexilli costa ecarinata, labello infundibulari capsulisque multo minoribus distincta.

Herba 2 dm. alta, e basi ramosa, glaberrima, parviflora, ramis gracilibus ascendentibus. *Folia* 2–3 cm. longa, opposita, sessilia,

oblonga vel lineari-oblonga, firma, inferiora obovata, acuta vel obtusa, spinuloso-serrata vel integerrima, enervia, costa subtus prominula; glandulae infrapetiolares 2, setaceae, deflexae vel 0. *Inflorescentia* simpliciter pedicellata; pedicelli foliis breviores, solitarii, capillares, fructiferi paullo elongati, deflexi. *Flores* vix 1 cm. expansi, exsiccati albi, labello reticulatim roseo picto; raphides 0. *Sepala* 2, linearia, acuminata, 4–5 mm. longa, uninervia. *Vexillum* amplum, orbiculare vel late ellipticum, paullo fornicatum, costa dorso gracili apice mucronata. *Alae* 9–10 mm. longae, anguste stipitatae; lobus basalis parvus, trigonus, truncatus, distalis multo major, obovatus vel dolabriformis; auricula dorsalis magna, protrusa vel decurva. *Labellum* infundibulare, ore elongato ascendente, in calcar breve uncinatum attenuatum. *Filamenta* brevia, filiformia; antherae minutae, didymae. *Ovarium* anguste ovoideum, rectum, acuminatum. *Capsulae* parvae, fere globosae, ad 1 cm. longae, brevissime stipitatae, acute rostratae, oligospermae. *Semina* globosa, ad 2 mm. diametro, laevia, atra, nitida.

Mysore bor. occident. Shimoga: Kumsi, 610–915 m., Oct. 1908, *A. Meebold*, 10,718.

Mr. Meebold describes the flowers as white with a pink spur; at his request I have named it after his venerated mother.

++ Sepala ovata; folia superiora verticillata.

8. I. Gardneriana, *Wight* Ic. t. 1050; Hk. f. Fl. Brit. Ind. i. 445, et in Rec. Bot. Surv. Ind. iv. (1906) 41, 46.

I. *setosa*, Hk. f. & Thoms. in Journ Linn. Soc. iv. 123; Fl. Brit. Ind. i. 445.

Kanara austral. Sirade: confinibus Mysore, Nov. 1908, *A. Meebold*, 10,712.

The specimens are poor but I think identifiable with *I. Gardneriana*, which had not previously been collected north of Malabar.

** *Frutex; folia inferiora opposita, superiora verticillata; inflorescentia simpliciter pedicellata; sepala ovata; semina tuberculata.*

9. I. bababudenensis, *Hk. f.*, sp. nov.; *I. Leschenaultii*, Wall. affinis, differt foliis longe petiolatis longe acuminatis 6–7 nerviis, floribus multo majoribus, vexillo orbiculari et alarum lobo basali distali multo minore.

Frutex sexpedalis, valde ramosus, glaberrimus, caule inferne lignoso. *Folia* 5–10 cm. longa, inferiora opposita, superiora 3–4-natim verticillata, petiolata, firma, ovata vel ovato-lanceolata, caudatim acuminata, crenato-serrata setulis interjectis 0, basi in petiolum gracilem 1–4 cm. longum angustata, costa gracili, nervis utrinque 7–8; glandulae infrapetiolares 0. *Inflorescentia* simpliciter pedicellata; pedicelli ex axillis superioribus pauci, solitarii, graciles, florentes foliis breviores, fructiferi paullo elongati, erecti. *Flores* ad 3 cm. expansi, albi; raphides 0. *Sepala* 2, late ovata, longe cuspidata, 5–6 mm. longa, 5-nervia. *Vexillum* amplum, orbiculare, 1·2–1·5 dm. diametro, apice bilobum, costa dorso carinata apice in rostrum recurvum validum producta. *Alae* sessiles, 1·5–2 cm. longae; lobus basalis subrotundatus, distalis bis terve longior, obovatus vel dolabriformis, dorso infra apicem lente excisus; auricula dorsalis rotundata. *Labelli* coriacei limbus 1–1·5 cm. longus, alte cymbiformis, in calcar robustum incurvum 1·5–2 cm. longum attenuatus,

ore 1–1·5 cm. longo horizontali acuto. *Filamenta* brevissima, subulata; antherae majusculae. *Ovarium* fusiforme, rectum, acutum. *Capsulae* gibbosim ventricosae, sessiles, acute rostratae, 1–1·2 cm. longae, oligospermae. *Semina* orbicularia vel obovoidea, subcompressa, 4 mm. longa, rugosa, atro-brunnea.

Mysore occident. Kulhutty; mont. Bababuden, 1830 m., Nov. 1908, *A. Meebold*, 10,706.

A near ally of *I. Leschenaultii*, DC., differing in the larger, long-petioled, caudately acuminate leaves, long pedicels, and the basal lobe of the wings much shorter than the distal.

III. Species Manipurenses.

* *Sepala lateralia* 2.

\+ Inflorescentia pedunculata.

10. I. spissiflora, *Hk. f.*, sp. nov.; herba elata ramosa *I. tripetalae*, Roxb., affinis, differt habitu, caule ramisque rigidis foliosis, foliis omnibus oppositis breviter petiolatis oblongis acutis, glandulis infrapetiolaribus raris vel 0, pedunculo elongato seminibusque minoribus laevibus glabris.

Herba 6–8 dm. alta, glaberrima vel foliis novellis puberulis, parviflora, caule ramisque rigidis. *Folia* 8–12 cm. longa, opposita, patula, breviter petiolata, firma, oblonga, acuta vel acuminata, integerrima vel minute serrulata, basi in petiolum 1–2 cm. longum angustata, nervis utrinque 12–16 gracillimis; glandulae infrapetiolares paucae, subulatae vel 0. *Inflorescentia* pedunculata; pedunculi 4–7 cm. longi, stricti, graciles vel robusti, patuli, imo apice 2–6-flori; pedicelli florentes 0·5–1·5 cm. longi, fructiferi 2–3 cm. longi; bracteae minutae, ovatae, acutae. *Flores* ad 2–3 cm. expansi, plus minusve carnosi. *Sepala* 2, ovata, 4–6 mm. longa, recta vel subfalcata, obtusa vel acuta, 5-nervia. *Vexillum* orbiculare vel oblatum, 1–1·4 cm. diametro, muticum, costa dorso in gibbum magnum late conicum obtusum tumescente. *Alae* 2·5–3 cm. longae, sessiles vel late breviter stipitatae; lobus basalis rotundatus, distalis vix longior, late dolabriformis; auricula dorsalis magna, reniformis, inflexa. *Labelli* limbus saccatim infundibularis, incurvus, 1·4–1·6 cm. longus, antice paullo supra basin rotundatus, repente in calcar limbo dimidio brevius incurvum attenuatus, ore horizontali 1·2–1·5 cm. longo subacuto. *Filamenta* gracilia; antherae parvae, obtusae. *Ovarium* subfalcatum, acuminatum. *Capsulae* anguste fusiformes, 1·8–2 cm. longae, utrinque attenuatae, fere rectae, acuminatae, oligospermae. *Semina* orbicularia, compressa, 2–2·5 mm. diametro, glabra, castanea.

Manipur. Kowpon, 1525 m., Nov. 1907, *A. Meebold*, 5879; Barak, 915–1220 m., *A. Meebold*, 6073, 6285, 6367.

11. I. teneriflora, *Hk. f.*, sp. nov.; herba foliis alternis longe petiolatis lineari-oblongis 0·5–1·5 dm. longis, floribus inter majoribus longe calcaratis.

Herba? elata, ramosa, fere glaberrima, longifolia, floribus majusculis, ramis ramulisque firmis. *Folia* 0·5–1·5 dm. longa, alterna, longe petiolata, membranacea, juniora sparsim setulosa, oblongo-lanceolata vel lineari-oblonga, longe acuminata, crenata setulis

interjectis 0, basi nuda vel pilis raris ciliata, in petiolum gracilem 3–8 cm. longum sensim angustata, costa subtus prominula, nervis utrinque in foliis parvis 5–6, in foliis maximis 10–14 ; glandulae infrapetiolares 0. *Pedunculi* foliis multo breviores, 3–5 cm. longi, 1-6-flori ; pedicelli filiformes, 2–3 cm. longi ; bracteae 3–6 mm. longae, lanceolatae, longe acuminatae, deciduae. *Flores* ad 4 cm. expansi, tenerrimi ; raphides 0. *Sepala* 2, late ovata vel oblonga, 8–10 mm. longa, acuta vel acuminata, membranacea, 3–5-nervia. *Vexillum* oblongo-ovatum, obtusum, fornicatum, muticum, dorso rotundatum, costa dorso carinata. *Alae* 2·5–2·7 cm. longae, subsessiles, basi cuneatae vel paullo constrictae ; lobus basalis amplus, rotundatus, distalis paullo longior, late dolabriformis, obtusus ; auricula dorsalis magna, reniformis, inflexa. *Labellum* late infundibulare, sensim in calcar elongatum gracile apice involutum vel annulare attenuatum, totum incurvum 3–3·5 cm. longum, ore elongato ad 2 cm. longo acuminato horizontali. *Filamenta* gracilia, 6 mm. longa ; antherae in capitulum incurvum connatae, obtusae. *Ovarium* gracile, lente curvatum, acuminatum. *Capsulae* erectae, ad 2 cm. longae, fere lineares, strictae, compressae, basi attenuatae, apice acuminatae, polyspermae. *Semina* minuta, 1·5 mm. longa, oblonga, castanea, villis arillata.

Manipur. Laimatak, 1525 m., Nov. 1907, *A. Meebold*, 6500.

I. teneriflora is I think nearly allied to *I. Forrestii*, Hk. f., of Upper Burma and Western Yunnan at lat. 25·50 N., in which the leaves are broader and serrate. It is named in reference to the remarkable delicacy of the floral organs.

+ + Inflorescentia saepissime simpliciter pedicellata.

12. I. longirama, *Hk. f.*, sp. nov. ; *I. tripetalae*, Roxb., affinis, differt caule elato robusto vage ramoso, ramis valde elongatis divaricatis foliosis, ramorum ramulorumque nodis glandulis subulatis densissime confertis infra petiolos circumdatis.

Herba? metralis vel ultra, vage ramosa, puberula vel fere glaberrima, parviflora, caule ramisque teretibus rigidis, ramulis 4–6 dm. longis divaricatis. *Folia* 8–12 cm. longa, opposita et ternatim verticillata, firma, petiolata, elliptico-lanceolata, utrinque acuminata, crenulata vel serrulata, basin versus nunc ciliata, costa nervisque utrinque 10–12 gracillimis, petiolo gracili 2–3 cm. longo ; glandulae infrapetiolares subulatae, densissime confertae. *Inflorescentia* simpliciter pedicellata ; pedicelli 1–2 cm. longi, graciles. *Flores* ad 2 cm. expansi, rosei ? *Sepala* 2, ovata vel ovato-lanceolata, 2 mm. longa, uninervia. *Vexillum* oblate orbiculare, fornicatum, ad 1·5 cm. latum, costa dorso medio alte rostrata apice mutica. *Alae* 2·3 cm. longae, stipitatae ; lobus basalis rotundatus, distalis paullo longior, dolabriformis ; auricula dorsalis magna, protrusa vel inflexa, decurva. *Labelli* limbus saccatus, 2 cm. longus, basi rotundatus et antice calcare breve erecto limbo dimidio breviore instructus, ore horizontali acuto. *Filamenta* brevia, filiformia ; antherae obtusae. *Ovarium* subsigmoideo-falcatum, apice incurvo acuto. *Capsulae* 1–1·5 cm. longae, fusiformes, teretes, rectae vel falcatae, apice acutae, incurvae, oligospermae. *Semina* obovoidea, 2–3·3 mm. longa, rugulosa.

Manipur. Irang, 1220 m., Nov. 1907, *A. Meebold*, 5867.

I. longirama has the flowers, fruit and seeds of *I. tripetala*, a species which, under many forms, abounds in the Assam Valley and extends westwards in Northern Bengal to Dacca and perhaps further, but nowhere assuming the characters of *I. longirama*.

13. I. tripetala, *Roxb.*, var. microscypha, *Hk. f.*; caule gracili, foliis oppositis et alternis, inflorescentia breviter pedunculata vel simpliciter pedicellata, floribus parvis, capsulis 1 cm. longis oligospermis.

Herba gracilis, fere glaberrima, 3–4 dm. alta, parviflora, caule inferne nudo saepe lignoso simplici vel parce ramoso. *Folia* 5–12 cm. longa, opposita vel alterna, petiolata, membranacea, ovata vel ovato-lanceolata, acuminata, subintegerrima vel minute serrulata, basin versus nuda vel ciliata, in petiolum gracilem 1·7 cm. longum angustata, costa gracili, utrinque 8–14-nervia; glandulae infrapetiolares breves, paucae, plurimae vel 0, saepe confertae. *Inflorescentia* nunc simpliciter pedicellata, nunc breviter pedunculata, pedunculo 0·5–1 cm. longo 3–5-floro; pedicelli capillares, 1–2 cm. longi; bracteae minutae, ovato-lanceolatae. *Flores* ad 1·5–2 cm. longi, rosei, calcare albo; raphides 0. *Sepala* 2, ovata vel ovato-lanceolata, acuminata, 0·5–3 mm. longa. *Vexillum* orbiculare, muticum, fornicatum, costa dorso medio gibbo conico instructa. *Alae* late breviter stipitatae, 1·5–2 cm. longae; lobus basalis amplus, rotundatus, distalis paullo longior, inflexus, obovatus; auricula dorsalis magna, reniformis, inflexa. *Labelli* limbus late infundibularis, incurvus, 1·5–1·8 cm. longus, deorsum ad basin rotundatum sensim attenuatus, antice supra basin in calcar breve incurvum obtusum repente constrictus, ore amplo 1·5 cm. longo obtuso apiculato horizontali. *Filamenta* gracilia; antherae obtusae. *Ovarium* subclavatum, acuminatum. *Capsulae* erectae, 0·9–1·1 cm. longae, medio tumidae, ellipsoideae, utrinque attenuatae, acutae, oligospermae. *Semina* 2–3 mm. longa, pyriformia vel obovoidea, compressa, laevia, minute papillosa, castanea.

Manipur. Jhirighat, 450 m., Nov. 1907, *A. Meebold*, 5687; Bishenpur, *A. Meebold*, 6725.

A very frequent form, extending westwards to Bengal.

* * *Sepala lateralia* 4; *folia alterna*; *inflorescentia pedunculata*.

\+ Herba gracilis, parviflora.

14. I. gibbisepala, *Hk. f.*, sp. nov.; herba foliis ovato-lanceolatis crenatis, alarum lobo distali loriformi.

Herba gracilis, erecta, glaberrima, parviflora, caule ramoso, ramis erectis. *Folia* 6–10 cm. longa, alterna, longe petiolata, firma, ovata vel ovato-lanceolata, caudatim acuminata, crenata setulis interjectis, basi in petiolum gracilem 3–5 cm. longum angustata, nervis utrinque 8–10; glandulae infrapetiolares 0. *Inflorescentia* pedunculata; pedunculi foliis breviores, gracillimi, erecti, pauciflori; pedicelli 2–3 cm. longi; bracteae ovato-lanceolatae, 2–3 mm. longae. *Flores* aurei. *Sepala* 4, 2 exteriora oblonga, acuta vel cuspidata, plana, 6–7 mm. longa, ima basi uno latere in lobulum obtusum patulum vel decurvum producta, 2 interiora subulata, hyalina. *Vexillum* ovatum vel oblongum, acutum, ad 7 mm. longum, costa tenui. *Alae* sessiles; lobus basalis oblongus vel rotundatus, distalis triplo longior, 1·5 cm.

longus, loratus ; auricula dorsalis 0. *Labelli* limbus brevis, cymbiformis vel scaphiformis, in calcar gracile ad 3 cm. longum sensim attenuatus, ore ascendente mucronato. *Filamenta* brevia, late linearia ; antherae in capitulum connatae.

Manipur. Kapon, 2440 m., *A. Meebold*, 9231.

I. gibbisepala is closely allied to the Himalayan and Khasian *I. drepanophylla*, Hk. f., also a Manipur species (Bishenpur, alt. 900 m., *Meebold*, 5986) from which it differs in the longer, oblong, acute sepals which are remarkable for being produced at the base on one side into a prominent lobule. The specimens are scanty and indifferent and are devoid of capsules which, it may be presumed, are linear, very slender and many-seeded. The labellum is in some flowers almost tubiform with an erect mouth.

+ + Herbae vel fruticuli robusti, floribus majusculis vel amplis carnosis, alarum lobo distali oblongo vel dolabriformi.

15. I. laevigata, *Wall.*, Cat. no. 4753, var. grandifolia, *Hk. f.* ; frutex foliis 1-2 dm. longis crenato-serratis setulis interjectis 0, bracteis oblongis, floribus albis flavo-tinctis.

Frutex ramosus, glaberrimus, grandiflorus, ramulis robustis teretibus. *Folia* 1–2 dm. longa, apices versus ramulorum conferta, alterna, petiolata, papyracea, exsiccata fusco-brunnea, nitida, oblonga, acuminata, grosse crenato-serrata, subtus pallidiora, basi in petiolum validum 3–5 cm. longum angustata, nervis utrinque 7–8 ; glandulae infrapetiolares 0. *Pedunculi* 4–5 cm. longi, medio 1–2-bracteati, 1–3 (?) -flori ; bracteae oblongae, 1–1·5 cm. longae. *Flores* ad 4 cm. expansi, carnosi, albi, flavo tincti, raphidibus instructi. *Sepala* 4, 2 exteriora orbicularia, 1·8–2 cm. diam., crasse carnosa, mutica vel apiculata, 2 interiora 2 cm. longa, falciformia, acuta, uno latere costata et incrassata. *Vexillum* amplum, reniformi-rotundatum, fornicatum, 2·5 cm. latum, dorso rotundatum, ecostatum, muticum. *Alae* sessiles, 2·5 cm. longae ; lobus basalis amplus, rotundatus, enervis, distalis paullo longior, angustior, panduriformis, apice bilobus ; auricula dorsalis rotundata. *Labellum* late infundibulare, in calcar robustum obtusum incurvum limbo subaequilongum sensim attenuatum, totum ad 2·5 cm. longum, crassum, ore horizontali ad 2 cm. longo. *Filamenta* 6–7 mm. longa, gracilia, superne incrassata et connata ; antherae obtusae. *Ovarium* falcatum, acuminatum.

Manipur. Barak, 1220 m., Nov. 1907, *A Meebold*, 6272.

The fleshy texture of the flowers renders them impossible of accurate analysis after being dried. They are described by Mr. Meebold as yellowish-white. In typical *I. laevigata* of the Khasia Hills they are straw-coloured streaked with red.

16. I. odontosepala, *Hk. f.*, sp. nov. ; frutex ? foliis 1–1·5 cm. longis fere integerrimis graciliter petiolatis, bracteis lanceolatis, sepalis 2 exterioribus ovato-oblongis cuspidatis.

Frutex? glaberrimus, floribus mediocribus, ramis ramulisque teretibus laevibus lignosis fistulosis. *Folia* apices versus ramorum conferta, 1–1·5 dm. longa, alterna, petiolata, firma, exsiccata atro-fusca, obtusa, oblanceolata vel oblongo-lanceolata, acuminata, integerrima vel obscure crenulata setulis interjectis, subtus concoloria, basi in petiolum gracilem 3–5 cm. longum angustata, costa

gracili, nervis utrinque 6–10 ; glandulae infrapetiolares 0. *Pedunculi* breves, 3·5 cm. longi, 1–4-flori ; pedicelli 1–2 cm. longi ; bracteae 1–1·5 cm. longae, lanceolatae, acuminatae. *Flores* ad 3–4 cm. expansi, flavi, rubro-striati, carnosuli, raphidibus instructi. *Sepala* 4, 2 exteriora 1·5–1·7 cm. longa, oblique ovato-oblonga, cuspidatim acuminata, basi rotundata, hilo laterali, 5–7-nervia, marginibus plus minusve dentatis, 2 interiora anguste lineari-elongata, acuminata, 1·5–2 cm. longa, membranacea, medio costata. *Vexillum* carnosum, orbiculare, 2·5 cm. latum, muticum, fornicatum, dorso carina crassa apice rotundata auctum. *Alae* sessiles, 2–2·5 cm. longae ; lobus basalis 1·5–1·8 cm. longus, oblongus, decurvus, apice rotundatus, distalis paullo longior, erectus, dolabriformis ; auricula dorsalis rotundata. *Labellum* cymbiforme, crasse carnosum, basi in calcar breve valde robustum incurvum obtusum attenuatum, ore horizontali, 2–2·5 cm. longo acuminato. *Filamenta* filiformia, 5 mm. longa ; antherae obtusae.

Manipur. Kapon, 2135 m., Nov. 1907, *A. Meebold*, 6491.

I have seen only two flowering peduncles, one with perfect flowers described above, the other with a much smaller flower in which the two wings are represented by four free spathulate organs much smaller than the sepals, and of which two are shorter and broader than the others. There are no stamens and the ovary is deformed.

17. **I. rubrolineata**, *Hk. f.*, sp. nov. ; herba foliis ovato-oblongis serrulatis, bracteis ovatis vel ovato-lanceolatis, sepalis 2 exterioribus oblique ovato-oblongis acuminatis.

Herba erecta, glaberrima, grandiflora, caule 5–6 dm. alto simplici rigido apice tantum folioso. *Folia* 6–10 cm. longa, alterna, petiolata, firma, ovato-oblonga, acuminata, serrulata, basi acuta, in petiolum gracilem 2–3 cm. longum angustata, nervis utrinque 6–8 ; glandulae infrapetiolares 0. *Pedunculi* 2–4-flori, petiolos subaequantes ; bracteae ovatae vel ovato-lanceolatae, acuminatae, 1–1·2 cm. longae. *Flores* ad 4 cm. expansi, flavi, rubro-striati, carnosi, raphidibus instructi. *Sepala* 4, 2 exteriora ovato-oblonga, acuminata, 1·5–2 cm. longa, concava, 5–7-nervia, 2 interiora longiora, tenuissima, flaccida. *Vexillum* amplum, orbiculare vel oblatum, 3 cm. latum ; costa dorso supra medium breviter cristata. *Alae* 3–3·5 cm. longae, basi cuneatae ; lobus basalis amplus, late oblongus vel rotundatus, distalis longior et angustior, obovato-oblongus, apice dilatatus et emarginatus ; auricula dorsalis rotundata. *Labelli* limbus crassus, late infundibularis vel cymbiformis, 2·5–3 cm. longus, horizontalis vel ascendens, ore acuminato ; calcar limbo multo brevius, robustum. *Filamenta* 0·8–1·2 cm. longa, gracilia ; antherae majusculae, connatae. *Ovarium* fere rectum, acutum.

Manipur. Laimatak, 1525 m., Nov. 1907, *A Meebold*, 6275.

The solitary specimen described above is in very poor condition in respect of foliage.

I. laevigata, *I. odontosepala*, and the above all require to be studied in the living condition.

XLIV.—GARNOTIELLA.

Otto Stapf.

In 1896 I described *Garnotiella*, a new genus of *Gramineae*, in Hooker's Icones Plantarum, tab. 2494. The name was suggested by its resemblance to and assumed affinity with *Garnotia*. It was based on a specimen collected by Vidal (no. 3994), in the Philippines. Some time ago, Mr. E. D. Merrill was good enough to call my attention to some specimens in his Philippine collections (no. 4322), which evidently represented the same plant and had been named *Andropogon leptos*, Steud., by Professor E. Hackel. The renewed examination of Vidal's specimen and its comparison with Hackel's description of *Andropogon leptos* left no doubt about the identity of the grasses and their position in *Andropogon*, if this genus is taken in the wide sense of Hackel's conception. This author placed it at the end of his sub-genus *Sorghum* as "species valde peculiaris." Steudel, on the other hand, enumerated it under the section *Chrysopogon*, and Nees named it, according to Steudel, *Chrysopogon tener* (MS.). As neither my own nor Hackel's description is quite complete or correct, it may be worth while to supplement and amend them with a view to establishing more clearly the sytematic position and status of the plant.

The mistake I made in comparing the grass with *Garnotia* was mainly due to my overlooking the rudimentary pedicels which are hidden away among the hairs surrounding the base of the spikelet, and in misinterpreting the awned innermost glume which in mature specimens like Vidal's readily becomes detached. Counting this glume as glume iii, to use Hackel's terminology, instead of as glume iv, the structural resemblance of the spikelets of *Garnotiella* and *Garnotia* becomes quite evident; moreover, it is supported by the general aspect of the inflorescence.

The rudimentary pedicels, that is the barren primary axis of the last divisions of the panicle, vary from 0·3–0·5 mm. in length, and from 0·03 to 0·005 mm. in diameter, and although—with the exception of the hyaline tips—multicellular in cross-section, are more or less transparent. They are ciliate, and overtopped by their own cilia and the hairs of the callus, some of which attain up to almost 1 mm. in length. The lower involucral glume has been described as nerveless; but under a high power, and when the glume is made sufficiently transparent, two pairs of extremely delicate nerves can be observed. They consist in cross-section of one or in the upper part of two extremely fine tracheids, about 3μ in diameter, and run towards the two apical teeth of the glume, leaving a slightly thinner middle band between them. The glume is rounded on the back, and possibly, under some circumstances, slightly concave between the nerve pairs as Steudel describes it. The upper involucral glume is distinctly laterally compressed and keeled. Flattened out, it also appears at first sight nerveless, or, owing to the fold which corresponds to the keel, one-nerved. The microscope, however, reveals also here the presence of extremely delicate nerves of the same character as in the lower glume; but there are only three of them, one along the middle line, and one on each side, slightly nearer to

the edge than to the keel. The lower floret is completely suppressed, unless a small scale which is sometimes present between the flower and the lower involucral glume is assumed to represent its floral glume or valve (glume iii of Hackel). It is absolutely nerveless, very delicate and sparingly ciliate at the top, and may attain as much as 0·5 mm. in length. In most cases I have, however, vainly searched for it; nor did Hackel observe it.

In describing *Garnotiella*, I took this scale to represent the palea; but in the light of my renewed investigation, I am strongly inclined to consider it as the rudimentary floral glume of the lower floret. The upper fertile floret consists then of its floral glume and the flower which, according to my observations, is destitute of lodicules, whilst Hackel mentions "lodiculae minutulae." The glume of this floret is distinctly bilobed to about $\frac{1}{3}$ to $\frac{2}{3}$ of its total length, the lobes being narrow, acute, and sparingly ciliolate near their tips. The flower is constantly diandrous, the anticous stamen being suppressed. The mature grain is broad-elliptic in cross-section with the longer axis in the median plane.

Taking into consideration the lateral compression which is particularly obvious in the upper involucral glume and the type of nervation which, however faint, is still preserved in the lower involucral glume, I cannot help thinking that *Garnotiella* approaches nearer *Chrysopogon* than *Sorghum*, and theoretically it can no doubt be reduced to the former, or, with Hackel, to *Andropogon*, *sensu lato*. But it approaches to no species in particular, and Hackel himself calls it "species valde peculiaris." To my mind it is a type as well marked and as easily recognisable as the most distinct genera in *Andropogoneae*, and quite worth being retained as a genus, perhaps allied and even derived from *Chrysopogon*, but differing from it in the extreme reduction of the parts of the spikelet, in size as well as in texture, and, to a certain extent, also in number. Owing to the fact, however, that it was already described as *Andropogon leptos* by Steudel, the specific name "*philippinensis*" proposed by me will have to give way to the older name "*leptos*," and the grass will therefore have to be called in future *Garnotiella leptos*.

XLV.—MISCELLANEOUS NOTES.

Mr. E. Bateson, of the Imperial College of Science and Technology, has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, Assistant Mycologist in the Federated Malay States.

Mr. Bateson, who has recently obtained a first class in the examination for the Associateship of the College, will undergo a further course of three months' training at Kew and the Imperial College before proceeding to take up his duties in the Federated Malay States.

Mr. Frederick G. Spring, of the University of Aberdeen, holder of the University Diploma and National Diploma in Agriculture, has been appointed by the Secretary of State for the

Colonies, on the recommendation of Kew, Assistant to the Director of Agriculture and Superintendent of Government Plantations in the Federated Malay States in the place of Mr. J. W. Campbell (*K.B.*, 1909, 342), resigned.

Botanical Magazine for September.—The plants figured are *Rhododendron Ungernii*, Trautv. (t. 8332); *Chirita rupestris*, Ridl. (t. 8333); *Tristellateia australis*, A. Rich. (t. 8334); *Micromeles caloneura*, Stapf (t. 8335); and *Alectorurus yedoensis*, Makino (t. 8336).

The *Rhododendron* grows at elevations of from 4000 to 6000 feet in the Caucasus, where the more familiar *R. ponticum*, Linn., is also a native. The illustration was prepared from material obtained from a plant which was raised from seed received from the Imperial Botanic Garden, St. Petersburg, in 1886 (not 1866, as recorded in the "Botanical Magazine"). *Chirita rupestris* is a blue-flowered herb belonging to the *Gesneraceae*, and is peculiar as to its habitat, being confined to the limestone rocks of Lankawi, an island off the coast of Kedah in the Malay Peninsula. The Kew plants were raised from seed communicated by Mr. H. N. Ridley, Director of the Singapore Botanic Garden, in 1905. The *Tristellateia* was obtained in 1902 from the same source as the preceding. It is a vigorous climber with yellow flowers, and is included in the *Malpighiaceae*. In distribution it ranges from the Malay Peninsula and Siam, through the Malayan Archipelago to Australasia, the Philippines, and Formosa. *Micromeles caloneura* is a handsome flowering tree or shrub from Western China, allied to the *Aria* section of the genus *Pyrus*. It has been introduced into cultivation by Messrs. J. Veitch & Sons, and flowered for the first time in their Coombe Wood nursery in 1909. *Alectorurus yedoensis* is an elegant hardy plant resembling a *Dianella*, and first described as a species of *Anthericum*. Its home is Japan, whence it has been sent to Mr. A. K. Bulley, of Ness, Neston, Cheshire, who presented to Kew in 1901 the plant which furnished the material for the illustration.

Botanical Magazine for October.—The plants figured are *Betula Maximowiczii*, Regel (t. 8337); *Rosa Moyesii*, Hemsl. et E. H. Wilson (t. 8338); *Styrax Hemsleyanus*, Diels (t. 8339); *Iris Wilsonii*, C. H. Wright (t. 8340); and *Primula Littoniana*, G. Forrest (t. 8341).

The *Betula* is a handsome species with large cordate leaves and has a remarkable resemblance to a *Tilia*. It is a native of Japan, and, according to Professor Sargent, who presented to Kew the seed from which the plants in the Kew collection were raised, it ranges northward through Saghalien into Manchuria. It was first introduced into European gardens by the late Mr. J. H. Veitch, who sent seeds from Yezo to England in 1888. In Japan its timber is used for house-building, and fishermen make torches of the bark which burns readily even when wet. *Rosa Moyesii* will no doubt prove a valuable addition to the already very numerous beautiful garden roses which have reached us from the same

country, China, where, on the mountains of Szechuan, at elevations of from 7000 to 9000 feet, seeds were collected for Messrs. J. Veitch & Sons by Mr. E. H. Wilson. The specimen illustrated was supplied by Messrs. Veitch in September, 1909. This species is allied to *R. macrophylla*, Lindl., and has deep blood-red flowers $1\frac{3}{4}$–$2\frac{1}{2}$ inches across. The *Styrax* comes from Central China, and, as in the case of the rose, and of the *Iris* which is the subject of the succeeding plate, its introducers are Messrs. James Veitch & Sons from whom the specimen figured was received. *S. Hemsleyanus* resembles in habit and flower the Japanese *S. Obassia*, Sieb. & Zucc., differing in several small characters. At Coombe Wood a plant has already reached a height of about 9 feet. *Iris Wilsonii* has affinities with *I. sibirica*, Linn., from which it may be distinguished by its long pedicels, long herbaceous spathes, and mostly yellow flowers. Seeds of this species were collected in Central China. *Primula Littoniana* is one of the many new plants discovered in Western China by Mr. George Forrest when collecting for Messrs. Bees, Ltd. It is a handsome species with many-flowered spikes 3–5 inches long, and is most nearly allied to *P. Vialii*, Delavay, differing chiefly in its larger proportions and in having the calyx-lobes the same length as the tube.

Nandi Rubber.—We have recently received for determination from Mr. D. E. Hutchins, Chief Conservator of Forests, British East Africa, dried specimens of a rubber-plant found in the Nandi forests, British East Africa. The plant proves to be *Landolphia ugandensis*, Stapf, described in the Flora Trop. Africa (Addenda), iv. 1, p. 589, from specimens collected by Mr. M. T. Dawe in Dumu forest, Buddu, Uganda, at 4000 feet. Mr. Hutchins sends us the following information about the plant :—

"This rubber vine is of peculiar interest. It yields a first-rate rubber, exists in considerable quantities in the Nandi forests, and it grows to the size of a Liana or Monkey-rope. It is believed to be the only commercial rubber which can be worked continuously, occurring naturally in an extra-tropical climate. The Nandi forest lying almost immediately under the Equator is at an elevation of between 6000 and 7000 feet ; and has an abundance of mist and cloud tending further to reduce the temperature, which I estimate to be about, on an average, the same as Cape Town. I have recently returned from a visit to the Nandi country, and forward herewith a note on the yield and conditions of growth of this interesting rubber."

Yield.—The present normal production of rubber from the Nandi forest is estimated to amount to 7 tons yearly, worth about £2000 at present Mombasa prices : this is on a basis of only one-third of the vines being tapped for rubber yearly. If it is found that less than two years' rest is sufficient for the vines, the yearly output will rise to 10 or 15 tons, and this again will be doubled if the present proposals for planting the Nandi rubber liana are proceeded with. It is estimated that at present there is an average of 7 lianas per acre with an average diameter of 2 inches and a maximum of 5 inches. The yield per vine tapped is averaged at

1 oz. Last year, when there was indiscriminate tapping in the forest, the total collection amounted to 16 tons. Twenty per cent. of the rubber is lost in smoking and drying. The rubber lianas occur scattered in small patches and strips throughout the wetter side of the forest. On account of this dispersion of the lianas, a man collecting the rubber does not average above 1 lb. a day of raw rubber.

Coagulation.—This has been effected with salt (the salt water being smeared on the surface of the liana), by chewing, and by the use of a fruit termed "Nogute." This fruit is produced in abundance on a small tree or shrub, and both the tree and fruit bear a close resemblance to the well-known Kei apple (*Aberia caffra*) of South Africa.

Noguk or Nōkōk is probably a species of *Flacourtia.*

The acidity of the fruit is about that of good vinegar, and rather less than bottled lime juice. What the acid is has not been determined.

Method of tapping.—The present method is by shaving off slices of bark down to the cambium layer, but it is difficult to prevent these cuts being made too deep, and when they are made too deep, the tissue dies progressively above and below them. Slitting diagonally with a knife seems a better method, and this is now being tried.

The Nandi rubber liana has a fruit in the form of a largish green ball like an orange, in the pulp of which the seed is immersed. The fruit contains so much latex that the rubber from it might pay for the cost of collecting the seed. The fruit is edible, and has a pleasant taste of cucumber. After eating it, bits of rubber are left in the mouth, something like the wax when honeycomb is eaten. In places the lianas show an abundant natural reproduction, and they are said to shoot again readily when cut. Generally, however, there is not much reproduction to be seen, though monkeys eat the fruit and distribute the seed. There seems no difficulty in propagating the Nandi rubber liana from nursery plants in the usual way, and this has now begun.

Nandi Climate.—The climate of the Nandi Plateau, though under the Equator, can only be described as extra-tropical in character. I compute the mean temperature as being between 60° and 61° (Fahr.), while the rainfall is ample for soil fertility, and the mist and clouds sufficient to mitigate excessive solar radiation. Rainfall figures for five years show a mean of about 75 inches. Kàpsàbit, in the centre of the plateau, lies at an elevation of 6300 feet, according to my barometer readings; and this, I understand, tallies with previous observations.

The Nandi Natives are not a numerous tribe. They are estimated not to amount to more than about 30,000. At present they seem more likely to decrease than increase, owing to the rapid spread of disease amongst them. Six years ago they were a warlike tribe with habits like the Masai, and troublesome on account of their raids on the Uganda Railway. They are located in a fine forest, containing much good timber, of which the area is estimated at 150 square miles. They do not practice kumri cultivation, and destroy the forest but little.

The Tomb of William Aiton.—This tomb, in Kew Churchyard, commemorates Mr. William Aiton, who held charge of the Royal Gardens at Kew from 1759 till his death in 1793, and the members of his family. By the courteous permission of the Rev. W. H. Bliss, Vicar of the Parish, the inscriptions on the tomb, which had become so weathered as to be barely legible, have been recut at the expense of a few friends who hold Aiton's memory in high regard. These inscriptions are on three panels of the tomb. The panel nearest the gardens bears the following words :—

THIS MONUMENT IS ERECTED TO THE MEMORY OF
MR. WILLIAM AITON,
LATE GARDENER TO HIS MAJESTY AT KEW,
WHO DIED 2ND FEBRUARY, 1793, AGED 62 YEARS.
ALSO IN THE SAME VAULT ARE INTERRED THE REMAINS OF
ELIZABETH AITON,
WIDOW OF THE DECEASED WILLIAM AITON,
WHO DIED DECEMBER 23RD, 1823, AGED 83 YEARS.
WITHIN THIS TOMB ARE ALSO DEPOSITED THE REMAINS OF
ANNE AUGUSTA TOWNSEND AITON,
YOUNGEST DAUGHTER OF WILLIAM AND ELIZABETH AITON,
SHE DIED AUGUST 1ST, 1828, AGED 46.

The panel on the opposite side of the tomb, facing Kew Bridge, is inscribed as follows :—

BENEATH THIS STONE ARE INTERRED THE REMAINS OF
JANE TOWNSEND AITON,
SECOND DAUGHTER OF THE LATE WILLIAM AND ELIZABETH AITON,
WHO DIED 9TH FEBRUARY, 1831, AGED 61 YEARS.
ALSO THE REMAINS OF
ELIZABETH TOWNSEND AITON,
ELDEST DAUGHTER OF WILLIAM AND ELIZABETH AITON,
SHE DIED 25TH JUNE, 1831, AGED 67 YEARS.
ON 8TH MAY, 1848, DIED SARAH TOWNSEND AITON,
AGED 73 YEARS, THE LAST SURVIVING DAUGHTER OF
WILLIAM AND ELIZABETH AITON—HER REMAINS
ARE ALSO DEPOSITED IN THIS TOMB.

Finally, one of the end panels bears the inscription :—

ALSO TO THE MEMORY OF
MR. WILLIAM TOWNSEND AITON,
OF KEW, ELDEST SON OF WILLIAM AND ELIZABETH AITON,
LATE DIRECTOR-GENERAL OF ALL THE ROYAL GARDENS,
HE DIED OCTOBER 9TH, 1849,
IN THE EIGHTY-FOURTH YEAR OF HIS LIFE.
WITHIN THIS TOMB LIES ALSO THE BODY OF
JOHN TOWNSEND AITON,
LATE DIRECTOR-GENERAL OF THE ROYAL GARDENS,
THE LAST SURVIVOR OF THE DESERVING AND ESTEEMED FAMILY
OF WILLIAM AND ELIZABETH AITON,
DIED JULY 6TH, 1851, AGED 74.

The few known facts of Mr. W. Aiton's biography have been recorded by Sir W. T. Thiselton-Dyer in the *Kew Bulletin* for 1891, p. 298. This account, based on a letter preserved in the Library at Kew, is in substantial accord with that to be found in Anderson's *Scottish Nation* ; the latter account, however, gives Aiton's birth-place as a village near Hamilton, not the town of Hamilton itself. Professor Bayley Balfour, Regius Keeper of the Royal Botanic Garden, Edinburgh, has kindly enlisted the interest of Mr. Henry Paton, of Edinburgh, in this question. Nothing could be found in the records of the parish of Hamilton or in those

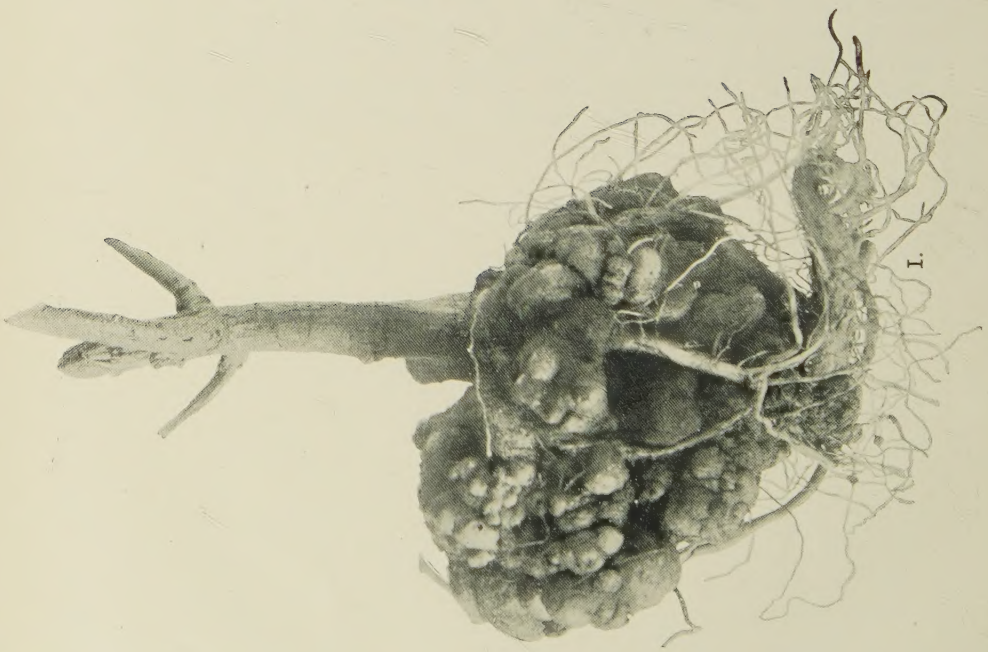
of the parish of Cambusnethan, but in the records of the adjoining parish of Avondale there are references in the baptismal roll from 1723 to 1764 to eleven individuals of the name, all natives of Wailsely (the form used from 1723 to 1739) or Wylesly (the spelling adopted from 1741 to 1743) or Wailsly (the form used from 1758 onwards). In the later entries, commencing in 1758, the family name is given as Aitoun; in all those which precede that year the spelling adopted is that consistently employed by the subject of this note, with respect to whom the entry in the roll, dated May 2nd, 1731, is as follows:—"William, son to William Aiton of Wailsely was baptised upon the 28th of April last."

The title page of the *Hortus Kewensis*, like the epitaph on his tomb, describes William Aiton as "Gardener to His Majesty," and there would appear to be no evidence that, officially or otherwise, he ever received any other designation. It will be noted that the portion of the epitaph which relates to William Townsend Aiton describes him as "Director General of all the Royal Gardens." This designation does not, however, as might be supposed, refer exclusively to his connection, as his father's successor, with the Royal Gardens at Kew. In the *Kew Bulletin* for 1891, p. 326, Sir W. T. Thiselton-Dyer has given *in extenso* a minute by the Lord Steward, dated 11th March, 1840; in that minute W. T. Aiton's title, so far as his connection with Kew was concerned, is cited as "Superintendent of the Botanical Gardens." The minute shows that of the various portions, at that date more or less separately treated, which now go to constitute the Royal Botanic Gardens, Kew, the only portion which was not then formally transferred from the control of the Board of Green Cloth to the control of the Commissioners of Woods and Forests was the 'Kitchen Garden,' now the 'Herbaceous Ground.' From that time therefore W. T. Aiton's Superintendentship, under the Board of Green Cloth, may have been confined to the Kitchen Garden, though it would appear (*Kew Bulletin* for 1891, p. 327) that, subsequent to the transfer in question and after his resignation of the Superintendentship of the 'Botanical Gardens' proper, then only 15 acres in extent, of which Sir W. J. Hooker became the Director on 1st April, 1841, W. T. Aiton remained for some five years in charge of the portion designated the 'Pleasure Ground.' In 1843, however, 48 acres of the 'Pleasure Ground' were devoted to purely botanical purposes, and in 1846 the Royal Kitchen Garden was abolished and the ground thus occupied was added to the Botanical Garden (*Official Guide*, p. 11). When the title 'Superintendent' was first recognised by the Board of Green Cloth is not clear; in 1810, on the title page of the second edition of the *Hortus Kewensis*, W. T. Aiton is termed 'Gardener to His Majesty' as his father had been in the previous edition. On the other hand W. T. Aiton's administrative charge was not confined to the various portions of what now constitutes the Royal Botanic Gardens, Kew. The extent of this charge is not clear but we learn from a letter, written at Kew either towards the end of 1804 or in the beginning of 1805 by Mr. W. McNab, that "Mr. Aiton " . . . . has had an addition to his charge by the death of " Mr. Forsyth, late of Kensington, who died in August, 1804,

" when His Majesty was pleased to appoint Mr. Aiton gardener " there likewise " (*History of the Royal Botanic Gardens, Edinburgh*, p. 302). The letter continues, " and Mr. John Aiton " has the whole of Windsor Gardens to himself." Whether this means that till the change above referred to took place Mr. John Townsend Aiton held charge at Windsor as his brother's subordinate but was from this time placed in independent charge there is not clear. But whatever the truth as to this may be it is evident that W. T. Aiton did hold charge of Royal Gardens other than those at Kew and it is probable that the designation employed in his epitaph had reference to this fact. That the designation was in use and that it was understood may be gathered from the Report submitted to the Treasury in 1838 by Dr. J. Lindley, in which there is a specific reference to the exercise by W. T. Aiton of his power as Director-general (*Kew Bulletin* for 1891, p. 321).

The epitaph makes a distinction between the designation 'Director-general of all the Royal Gardens' applied to W. T. Aiton, and that of 'Director-general of the Royal Gardens' applied to his younger brother John Townsend Aiton. We have seen that after 1804 J. T. Aiton had charge of the Royal Gardens at Windsor. But it appears that at a later date he lived at Kensington Palace; he wrote letters dated from there between 1841 and 1845. He seems indeed to have had charge of the Kensington Palace Gardens in 1841, though whether independently or as the subordinate of his brother, W. T. Aiton, is not clear, for he wrote thence on 21st September, 1841, informing Sir W. J. Hooker of the despatch to him of certain fruit trees. After the death of W. T. Aiton in 1849, J. T. Aiton resided in the house which his brother had occupied. But, at the time of his own death, which took place in 1851, no portion of what now constitutes the Royal Botanic Gardens, Kew, was included in the Director-generalship alluded to in J. T. Aiton's epitaph.

II.



I.

CROWN GALL.

To face page 309.]